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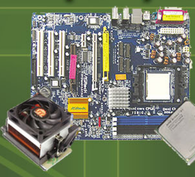

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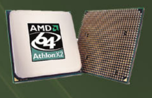

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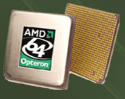

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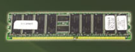

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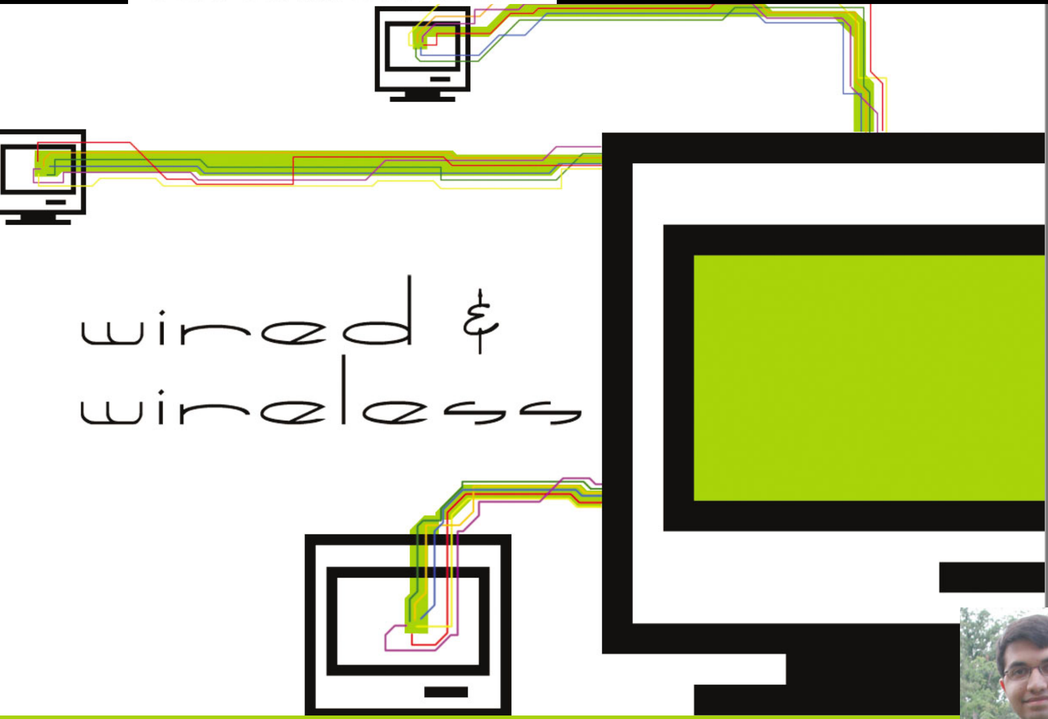

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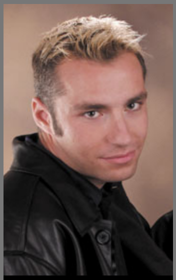
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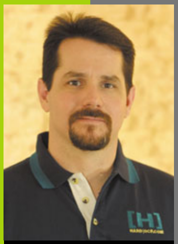
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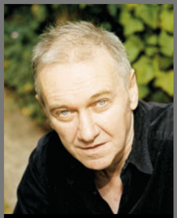
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CORRECTIONS:
On page 34 of the January issue, we incorrectly ran a picture of a dual-Xeon motherboard with our review of ATI's All-In-Wonder X1800 XL (shown here).

Infinite Loops

Strange stats and other oddball items from computing's periphery

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EDITOR'S NOTE

It's early yet, but it appears as though 2006 will be an interesting year in the world of tech, especially where PCs are concerned. We're on the cusp of a new crop of Intel CPUs for desktops and notebooks, AMD is readying its Socket M2 stuff, both companies are talking about moving beyond dual-core CPUs already, and so on. We may even see a new version of Windows this year, which could be really good news or really awful news, depending on one's point of view—and based on how it turns out.

When it comes to new PC gear I don't think it's possible to have too much of a good thing; you just have more options, more new ways to configure your system. But I have to admit that having so many choices on the horizon does present me with a bit of a quandary when it comes to living up to my New Year's Resolution. You know, the one I made in the last issue about building a new, better PC. My resolve is as strong as ever, but I find myself hesitating ever so slightly because to take the plunge on today's best chip might really satisfy my tech jones right away, but if something really hot pops up in the space of the next three or four months, I'll be right back where I am today, looking wistfully at yet another $1,000-plus CPU and wondering how badly my kids really need to go to college after all.

That said, I am determined to make a decision one way or the other soon, and by the time you read this the information I will have gathered at the 2006 Consumer Electronics Show in Vegas will be my guide. Yeah, it's a consumer electronics show, but since the demise of the once-great Comdex it's one of the top shows for PC companies, too, especially given their current obsession with gaining a foothold in living rooms around the world. So *CPU* will be there, scouring the Las Vegas Convention Center (and, most likely, the In-N-Out Burger) for all the upcoming hardware news we can beg, borrow, or steal, so we can bring it all together here for you.

In the meantime, check out the networking articles in this month's Spotlight section for info on what's new in wired and wireless networking, a look at how some of the latest gear stacks up, and some tips on cool networking projects you may not have tried yet. While you're here, be sure and see how a slew of 3Gbps SATA hard drives fared in our roundup on page 16 and take in our impressions of Microsoft's new Xbox 360 and several launch titles (starting on page 89). Oh, and be sure and stop by page 14, where The Saint offers Samit some pointers on smooth assimilation.

Enjoy the issue, let us know what you think, and we'll see you in 30.

Chris Trumble, Publication Editor, *CPU*

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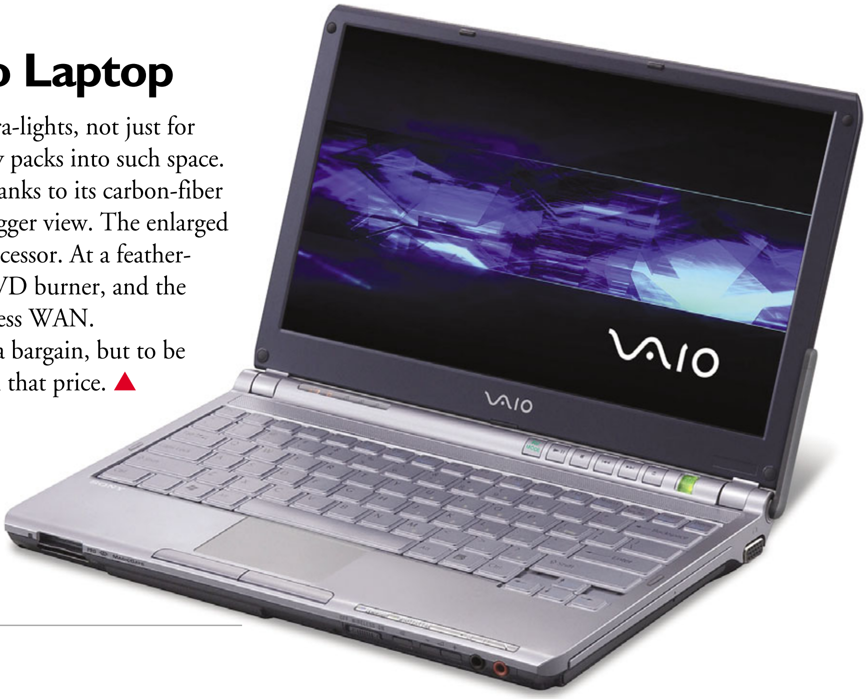
Compiled by
Steve Smith

Sony's Carbon-Shielded, Always-Connected Nano Laptop

We've always been impressed by the VAIO ultra-ultra-lights, not just for their weight but for the incredible functionality Sony packs into such space. But now we're really salivating. The new TX line, thanks to its carbon-fiber casing, is actually lighter and slimmer and offers a bigger view. The enlarged 11.1-inch LCD is about 45% slimmer than its predecessor. At a feather-like 2.76 pounds, the TX even has a double-layer DVD burner, and the latest releases also have an integrated Cingular Wireless WAN. Ordinarily, we wouldn't call a $2,500 starting price a bargain, but to be this cool and this connected wherever we go is worth that price. ▲



Carbon-fiber casing brings the VAIO TX to just over 2 pounds.

Forget The Fob, Stuff Your Wallet With Gigs

The USB connector might jab into your thigh a bit, but otherwise the Wallet Flash is an excellent idea for smart storage design.

Apologies to all of our tech dweeb brethren out there who love to tote their mini-storage on a keychain, but USB fobs are just too dorky for us. Wallet Flash (www.walletex.com) packs up to 2GB of storage into a form factor that rests flat against our khakis. A double-sided USB connector protrudes from one corner for easy connectivity and compatibility with Windows, Linux, and Mac OSes. Manufacturer Walletex can also customize the card for businesses and even add photos, logos, and a magnetic stripe to the Wallet Flash's surface. Imagine handing someone a business card that also contains gigabytes of company information. Well, an expensive business card; the current 128MB model is $29.99. ▲

Ditch The Junky Media Server, Too

Want to give everyone on your home network access to a common pile of files? The typical answer for most advanced networkers is to cobble together a crappy, old PC and network it in as a dedicated file server. I/OMagic (www.iomagic.com) has a better response to this problem with the introduction of its 300GB EZ NetShare standalone drive ($299.99). The external unit plugs directly into your router via Ethernet cable, and driver software puts it onto the network, complete with password protection for secure file and folder access among specific users. A USB 2.0 link lets the EZ NetShare double up as an external hard drive for any PC. Now you don't need to keep one of your main PCs on 24/7, so everyone else in the house can sup off of your hard drive. ▲

The EZ NetShare plops 300GB of storage onto your network without the bother of setting up a server.

Creative's Zen Vision:M: Who's Copying Whom?

Even as its new Zen Vision:M A/V player launches with a decidedly iPod-ish look and feel, Creative says Apple's the real copycat. To its credit, the Vision:M beats the iPod on color depth (262,144 colors vs. 65,536) and video format support (MPEG, Motion JPEG, XviD, WMV, *and* DivX). The 30GB $330 model adds FM tuning/recording, and the photo-zooming iPodders can only covet. More to the point, Creative's CEO Sim Wong Hoo says that Apple is the imitator because iPods may be using MP3 navigation techniques that Creative recently patented. Apple scorches the Zen's market share, but Steve Jobs could end up paying Creative royalties on every iPod sold if Hoo gets his way. ▲

iPod wannabe Zen Vision:M hopes to beat the Apple on better video functionality, if not hype.

Hardware Mole

VoIP & Wi-Fi Finally Merge

Wi-Fi connectivity and IP telephony have always seemed to be a natural combination, but until now we lacked a handset that plugged into VoIP services across a wireless network. Vonage answers the call with the UTStarcom F1000 phone that will work with any open-access 802.11b hotspot. Vonage embeds the $79.99 (after instant rebate) handset with its phone service to help connect directly into the VoIP network and support all ordinary Vonage phone features. For now, you won't be able to place a call from Starbucks or any private network, however. The F1000 can't handle hotspots that require additional payment. ▲

Holographic Storage Coming Soon

Maxell and InPhase Technologies say that holographic data techniques would store 150 million pages, or 63 times the capacity of a DVD, on a single 5.25-inch disc. Lasers and 3D holographic images would store and retrieve data at ultra-high densities and could ultimately put 1.6TB of data on a single disc with transfer speeds of up to 120Mbps. "Unlike other technologies that record one data bit at a time, holography allows a million bits of data to be written and read in parallel with a single flash of light," says Liz Murphy, VP of marketing at InPhase Technologies. Expect an early 300GB, 20Mbps model later this year. ▲

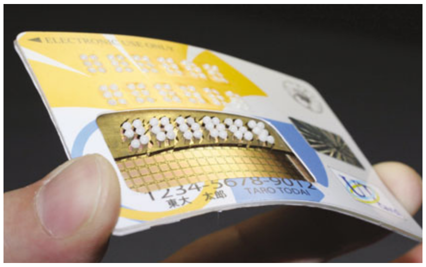
TiVo Your PSP

DVR functionality comes to the PSP with the $149 Neuros MPEG-4 Recorder 2 (www.neurostechnology.com). The Recorder is a standalone box that converts video directly from a TV (time-shifted recording, too), VHS or DVD deck, and even a camcorder or TiVo into MPEG-4 format. You can copy everything onto a compatible Memory Stick or Compact Flash card for use in PSPs or other CF-enabled remote devices. Neuros says consumers have fair-use rights to copy media they already own; although, we bet movie and TV studio lawyers are already looking for the loophole that lets them sue these guys. ▲

TV on a stick, a Memory Stick that is.

Compiled by DeanTakahashi

A Flexible Display For The Visually Impaired



Technologies such as synthesized speech and voice recognition have helped numerous people who are visually impaired. Researchers at the University of Tokyo, Dr. Takao Someya and Dr. Takayasu Sakurai, think that they can take the next step up with displays that help the visually impaired. They have developed a plastic, credit card-like display that shows Braille lettering by creating an array of bumps on its rubber-like surface. These bumps are created by Braille writing from an ebook, for example. To build the display, the researchers created an array of organic pentacene TFTs with top-contact geometry under plastic substrates. Next they added actuators from conductive polymer. Finally a transistor beneath the actuator supplies voltage to it. This voltage then moves the actuator upward and pushes up a small dome into the thin film creating Braille bump symbols that the visually impaired can then feel with their fingers. ▲

Intel Builds Faster Prototype Transistors With Indium Antimonide

Rsearchers at Intel and Qinetiq say they have crafted prototypes of quantum-well transistors that are 50% faster than silicon transistors and use only one-tenth of the power. The prototypes are made out of indium and antimony. The transistor has a traditional source and drain, and the channel between them is made of indium antimonide. Rob Willoner, a technology analyst at Intel, says that the transistors can speed the flow of electrons without drawing more power, and Intel can fuse them into silicon using typical factory technology. Intel showed off the technology in December 2005 at the International Electron Devices meeting in Washington, D.C. ▲

Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

*Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

CPU	Released	Original price	Last Month's price	Current price
AMD Athlon 64 3800+	6/1/2004	$720**	$346	$315
AMD Athlon 64 4000+	10/19/2004	$729**	$394	$389
AMD Athlon 64 FX-55	10/19/2004	$827**	$849	$799
AMD Athlon 64 FX-57	6/27/2005	$1031**	$1,089	$1,011
AMD Athlon 64 X2 dual-core 3800+	8/1/2005	$354**	$315*	$315*
AMD Athlon 64 X2 dual-core 4200+	5/31/2005	$537**	$443	$409*
AMD Athlon 64 X2 dual-core 4400+	5/31/2005	$581**	$497*	$497*
AMD Athlon 64 X2 dual-core 4600+	5/31/2005	$803**	$628*	$628*
AMD Athlon 64 X2 dual-core 4800+	5/31/2005	$1001**	$780*	$780*
Intel Pentium 4 Extreme Edition 3.73GHz 2MB cache 800MHz FSB	2/21/2005	$999**	$1,021*	$999*
Intel Pentium Processor Extreme Edition 840 3.2GHz dual-core	4/18/2005	$999**	$1,005*	$1,005*
Intel Pentium 4 540 3.2GHz 1MB cache 800MHz FSB 90nm	6/27/2004	$278**	$225*	$225*
Intel Pentium 4 550 3.4GHz 1MB cache 800MHz FSB 90nm	6/27/2004	$417**	$284*	$289*
Intel Pentium 4 560 3.6GHz 1MB cache 800MHz FSB 90nm	6/27/2004	$637**	$367*	$350
Intel Pentium 4 570 3.8GHz 1MB cache 800MHz FSB 90nm	11/15/2004	$637**	$646*	$530*
Intel Pentium 4 630 3GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$224**	$139*	$169*
Intel Pentium 4 640 3.2GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$273**	$190*	$209*
Intel Pentium 4 650 3.4GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$401**	$252*	$268*
Intel Pentium 4 660 3.6GHz 2MB cache 800MHz FSB 90nm	2/21/2005	$605**	$405*	$329*
Intel Pentium 4 670 3.8GHz 2MB cache 800MHz FSB 90nm	5/26/2005	$849**	$585*	$582*
Intel Pentium D 2.8GHz dual-core 2MB cache 800MHz FSB 90nm	5/26/2005	$241**	$244*	$235*
Intel Pentium D 3GHz dual-core 2MB cache 800MHz FSB 90nm	5/26/2005	$316**	$317*	$305*
Intel Pentium D 3.2GHz dual-core 2MB cache 800MHz FSB 90nm	5/26/2005	$530**	$531*	$518*

Ambarella Shoots For Low-Power, High-Def Video Camcorders

Ambarella came out of stealth mode after two years of work on a family of chips that could lead to inexpensive handheld high-definition video camcorders that double as digital cameras. Les Kohn, co-founder of Ambarella, says that the new A1 digital camera platform draws less than 1W of power and can capture, compress, and display video in H.264 high-definition format. The company hopes that the new A1 platform will fuel the growth of HD camcorders that will eventually become smaller and less expensive versions of Sony's $2,000 HC1 HD camcorders that hit the market later this year. Kohn says that the chip is several times more efficient at compressing video than earlier MPEG-2 video chips. He also says that the chip implements the full set of tools and profiles available under the H.264/AVC video compression standard, allowing for very high picture quality. Analysts from In-Stat/MDR and International Data say combining the Ambarella chips with flash memory chips could lead to inexpensive camcorders and eventually even HD camcorders on cell phones. The chips are expected to ship in volumes in the first quarter of this year. ▲

Compiled by Trista Kunce

Google Wants To Analyze Your Web Site

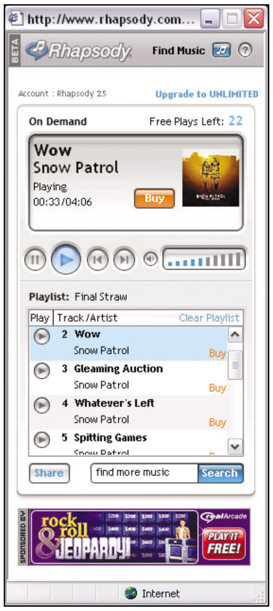
Google has created a free service called Google Analytics (www.google.com/analytics) that will help businesses and vain bloggers keep track of traffic on their site. Google Analytics lets you learn more about the visitors to your Web site, which you can in turn use to improve your site. The service gives you several Web analytics tools, including dashboards, Roles-based report, a browser overlay, integration with AdWords, and more. So, if you're interested in how many people from Hopeulikit, Ga., are on your site or reading your blog, you can find out with Google Analytics. (*NOTE: Google wasn't accepting new accounts when we went to press.*) ▲

Microsoft & Google Take Off Their Fightin' Gloves

Despite any recent ill feelings the companies have felt for one another, Microsoft and Google recently took off their fighting gloves to reach into their respective deep pockets. The companies, along with Sun, are helping to fund a $7.5 million Internet research lab called RAD (Reliable, Adaptive, and Distributed Systems) to be built on the campus of the University of California, Berkeley. The lab will help businesses introduce more innovative Web-based services to Web users. Only time will tell if the new Internet lab will help Google and Microsoft become best friends forever or simply provide an enclosure for their next cage match. ▲

Get "Real" Legal Songs You Can Share

RealNetworks has launched a Web-based version of its Rhapsody music service called Rhapsody.com that lets you listen to your favorite tunes via the Web. Sound similar to all the other Internet-based music sites out there? Well, with Rhapsody.com you don't need to download any software or your music library—meaning you can listen to your tunes on all your computers. The service's free version lets you listen to up to 25 streams per month and access 25 radio stations. If you want more streaming and downloading, you can either upgrade to Rhapsody Unlimited ($9.99 per month) or Rhapsody To Go ($14.99 per month). Rhapsody.com is in beta release, so expect some bugs. One bug that particularly annoyed us was that there wasn't a way to save our playlists. ▲



Account : Rhapsody 25

On Demand Free Plays Left: 22

Wow
Snow Patrol
Playing
00:33/04:06

Playlist: Final Straw

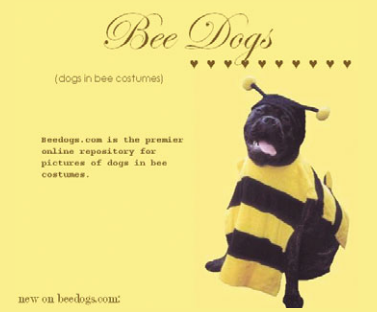
Play	Track/Artist
	2 Wow Snow Patrol
	3 Gleaming Auction Snow Patrol
	4 Whatever's Left Snow Patrol
	5 Spitting Games

find more music

Site Seeing

Bee Dogs

Bee Dogs (www.beedogs.com) is a site dedicated to dogs in bee costumes. Why check it out? Any breed of dog in a bee costume will add a happy buzz to your day—or buzz off your boss. Check out all the links to see not only bee dogs, but also bee people, bee kids, bee dog and lady bug dog friends, bee ferrets, and so on.



Beedogs.com is the premier online repository for pictures of dogs in bee costumes.

Roadsideamerica.com

If you're planning on road-trippin' this summer, you need to check out this site filled with odd tourist attractions before you take off. Roadside america.com offers such "odd and hilarious" travel sites as a toilet walk in Texas, a banana museum in Washington, and a giant lady's leg sundial in Indiana. ▲

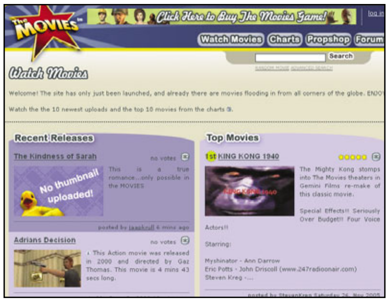
Meebo.com

Your wife uses Yahoo! Messenger, your son likes MSN Messenger, your mother-in-law just got AOL AIM, and you have them all. Make things easier on yourself and access all your IM accounts without having to download their software by using the Meebo .com beta. (Also, even if your office has banned all instant messengers, Meebo.com will keep you connected—you didn't hear that from us.) ▲

Gamers: Want To Direct Your Own Movie?

Mowing down space mutants in the bloody corridors of Doom 3 is just a warm-up for our real dream: moviemaking. Spielberg wannabes and even aspiring graphic novelists get new tools for converting game engines into their own narrative epics. Lionhead Studios' The Movies gives players a flexible 3D movie set, and players can upload these sophisticated productions to the Lionhead Web site (movies.lionhead.com/movies). (Check out the "King Kong" remake.) If static imagery is your bag, then PlanetWideComics.com's Comic Book Creator lets you grab game screens and edit them into comic book templates, add dialogue bubbles and text effects, and then push them out as PDF comics. You, too, can turn Master Chief into a sensitive, chick-flick hero. ▲

The Movies and Comic Book Creator let gamers re-edit their favorite hobby into DIY narratives.



Welcome! The site has only just been launched, and already there are movies flooding in from all corners of the globe. ENJO

Watch the the 10 newest uploads and the top 10 movies from the charts.

The Kindness of Sarah — This is a true romance...only possible in the MOVIES

posted by jaaskrull 4 mins ago

Adrians Decision — This Action movie was released in 2000 and directed by Gaz Thomas. This movie is 4 mins 43 secs long.

KING KONG 1940 — The Mighty Kong stomps into The Movies theaters in Gemini Films re-make of this classic movie.

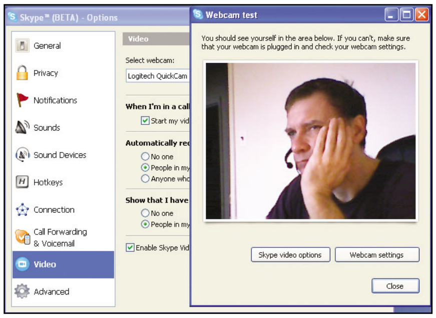
Special Effects!! Seriously Over Budget!! Four Voice Actors!!

Starring:

Myshinator - Ann Darrow
Eric Potts - John Driscoll (www.247radioonair.com)
Steven Kreg -....

See The Difference With Skype 2.0

The successful Internet telephony company, Skype, brings video chat to the next level with a beta release of Skype 2.0. With Web cams on both ends of an Internet call, you and your buddies can now see each other, even in full screen. A small corner window superimposes your own cam view, so you can make sure you don't have gunk stuck in your teeth. In this release Skype also enhances call quality, adds personalization via avatars and custom ringtones, and improves contact grouping. A handy toolbar for Outlook also lets you make a call directly from your email contact list. Our buddy list in full-screen video? Hmm. We'll have to think about this. ▲



Select webcam: Logitech QuickCam

When I'm in a call
☑ Start my vid

Automatically rec
○ No one
● People in my
○ Anyone who

Show that I have
○ No one
● People in my

☑ Enable Skype Vid

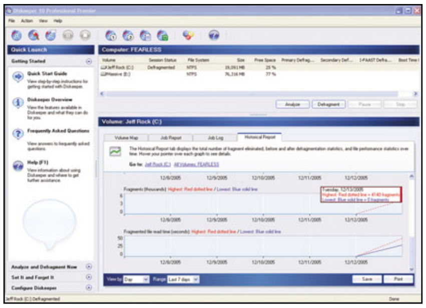
You should see yourself in the area below. If you can't, make sure that your webcam is plugged in and check your webcam settings.

The long-promised picture phone comes to life with Skype's next release.

Diskeeper Turns 10

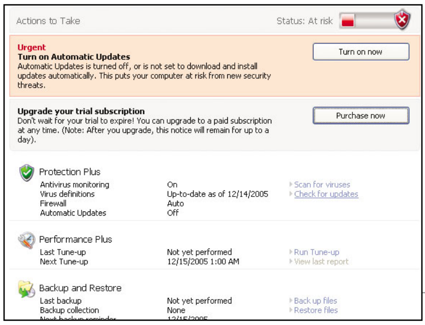
Much older than Skype, the perennial alternative to Windows' rudimentary hard drive defrag routines moves into its 10th version this month, promising even faster, better defragmentation using less system overhead. With support for 64-bit OSes and a TVE (Terabyte Volume Engine) for large volume drive arrays, the tool is ready for top-end rigs. The new I-FAAST (Intelligent File Access Acceleration Sequencing Technology) reads the performance characteristics of each drive and rearranges commonly accessed files for the fastest delivery. Diskeeper 10 Home Edition is available for $29.95. ▲

Diskeeper 10th version has better speed and support for terabyte-sized drives.



Security On Tap: Windows OneCare Live Goes Almost Live

Following a recent Bill Gates edict to turn more of its software products into a Web service model, Microsoft launched Windows OneCare Live (beta.windowsonecare.com) beta in December 2005. The security suite wraps a firewall, antivirus protection, PC maintenance, and even backup and restore functions into a single package that runs automatically, fed by constant updates from the Web. From what we saw, OneCare is an enhanced security center, adding Microsoft's own virus scan and tune-up routines that defrag your drive, flag files for necessary backups, and check Microsoft for software updates. ▲



Status: At risk

Urgent
Turn on Automatic Updates
Automatic Updates is turned off, or is not set to download and install updates automatically. This puts your computer at risk from new security threats.

Upgrade your trial subscription
Don't wait for your trial to expire! You can upgrade to a paid subscription at any time. (Note: After you upgrade, this notice will remain for up to a day).

Protection Plus
Antivirus monitoring: On
Virus definitions: Up-to-date as of 12/14/2005
Firewall: Auto
Automatic Updates: Off

Performance Plus
Last Tune-up: Not yet performed
Next Tune-up: 12/15/2005 1:00 AM

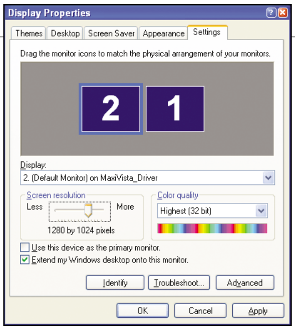
Backup and Restore
Last backup: Not yet performed
Backup collection: None

OnceCare Live looks like a pumped-up Windows XP SP2 Security Center.

Software Shorts

MaxiVista Extends Your Desktop To Your Laptop

No dual-monitor support on your graphics card? No problem. The new MaxiVista tool ($29.95; www.maxivista.com) extends your Desktop display to a laptop or any other PC via Ethernet or wireless LAN. A virtual VGA driver on the host machine and viewers on the client let you drag a window off of one display edge and on to a second or third PC. Now you can take that travel laptop out of the case and make it a second monitor at home. ▲



Drag the monitor icons to match the physical arrangement of your monitors.

Display:
2. (Default Monitor) on MaxiVista_Driver

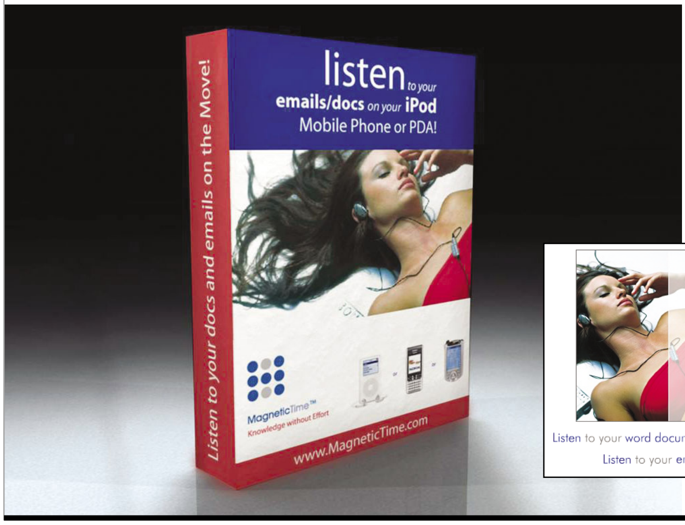
Screen resolution: 1280 by 1024 pixels

Color quality: Highest (32 bit)

☐ Use this device as the primary monitor.
☑ Extend my Windows desktop onto this monitor.

Let The Lovely Heather Read Your Emails

Computer text-to-voice synthesis comes closer to the HAL 9000 with MagneticTime ($39.99), which uploads vocal readings of your email inbox to a PDA, some mobile phone models, and even an iPod. The program converts new messages, as well as any Word docs, into MP3-format voice renderings. HAL's real-life counterpart is the lovely sounding Heather, who reads your messages with human tones that are almost sultry. Help, we may be in love with our inbox. ▲

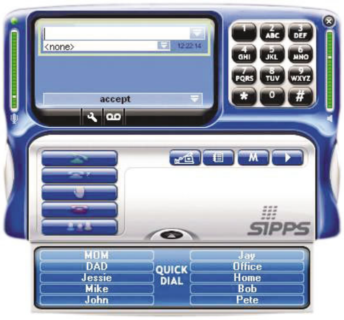


MagneticTime uses advanced and very convincing voice synthesis to read you emails over remote devices.

Listen to your word documents on your iPod, Mobile Phone or PDA
Listen to your emails on your iPod, Mobile Phone or PDA

Nero Rips Into VoIP

Nero blazes a new trail into Internet telephony with SIPPS Connect. The package includes two licenses for you and a buddy to make free PC-to-PC calls, including three-way and video calls, to anyone running the software. You can also record and play back conversations. Through the SIPTalk service (one month free trial), Nero users also access low-rate call plans to landlines worldwide and a range of caller services. Skype is no longer the only game in town. ▲



Nero's SIPPS Connect tries to grab some VoIP market share.

BIOS Upgrades Available Online

Compiled by Dave Altavilla

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpufeb06/bios to see our entire upgrade list.

Motherboard	Date Available	URL
Abit AN8 SLI and AN8 Ultra	11/17/2005	file.abit.com.tw/pub/download/bios/an8//an819.zip
Abit Fatal1ty AA8XE	10/17/2005	file.abit.com.tw/pub/download/bios/fa8xe//fa8xe16.zip
Asus A8N-SLI Premium	11/04/2005	dlsvr01.asus.com/pub/ASUS/mb/socket939/A8N-SLI%20Premium/A8NSP009.zip
EPoX EP-5PDAJ	11/24/2005	www.epox.nl/downloads/download.php?download_id=249&mode-zip
Intel D955XBK	11/16/2005	ftp://download.intel.com/design/motherbd/bk/BK95510J.86A.2015.EB.exe
MSI PT880 Neo-LSR	11/26/2005	216.158.218.35/edoc/bios_uploads/7008v19.zip

DIGITAL ECONOMY

Compiled by Steve Smith

The Job Search

Don't die yet! You may be qualified for a job at Amp'd Mobile. The hip new wireless telco is flooding TV with its provocative "Try Not to Die" ads, and BREW, Flash Lite, and Java programmers could join the weirdness. As UI Software Engineer you would design the rad new phone interface, Amp'd Live, a highly customizable phone deck that accesses MP3 libraries, music videos, and 3D games. Obviously you need to know your handsets and 3G network protocols, but from the looks of the job description, Amp'd will be dabbling in next-gen hybrid phones that handle Wi-Fi, as well. Partnerships with extreme sports stars, user-generated content Web sites, mobile blogs, and other edgy offerings seem to ensure that Amp'd isn't going to be offering your typical family phone plan.

21.6%

U.S. share of worldwide broadband subscriptions

Computer Industry Almanac

16.5%

China's share of worldwide broadband subscriptions

Computer Industry Almanac

Hour of the day when Web users are most likely to click an ad

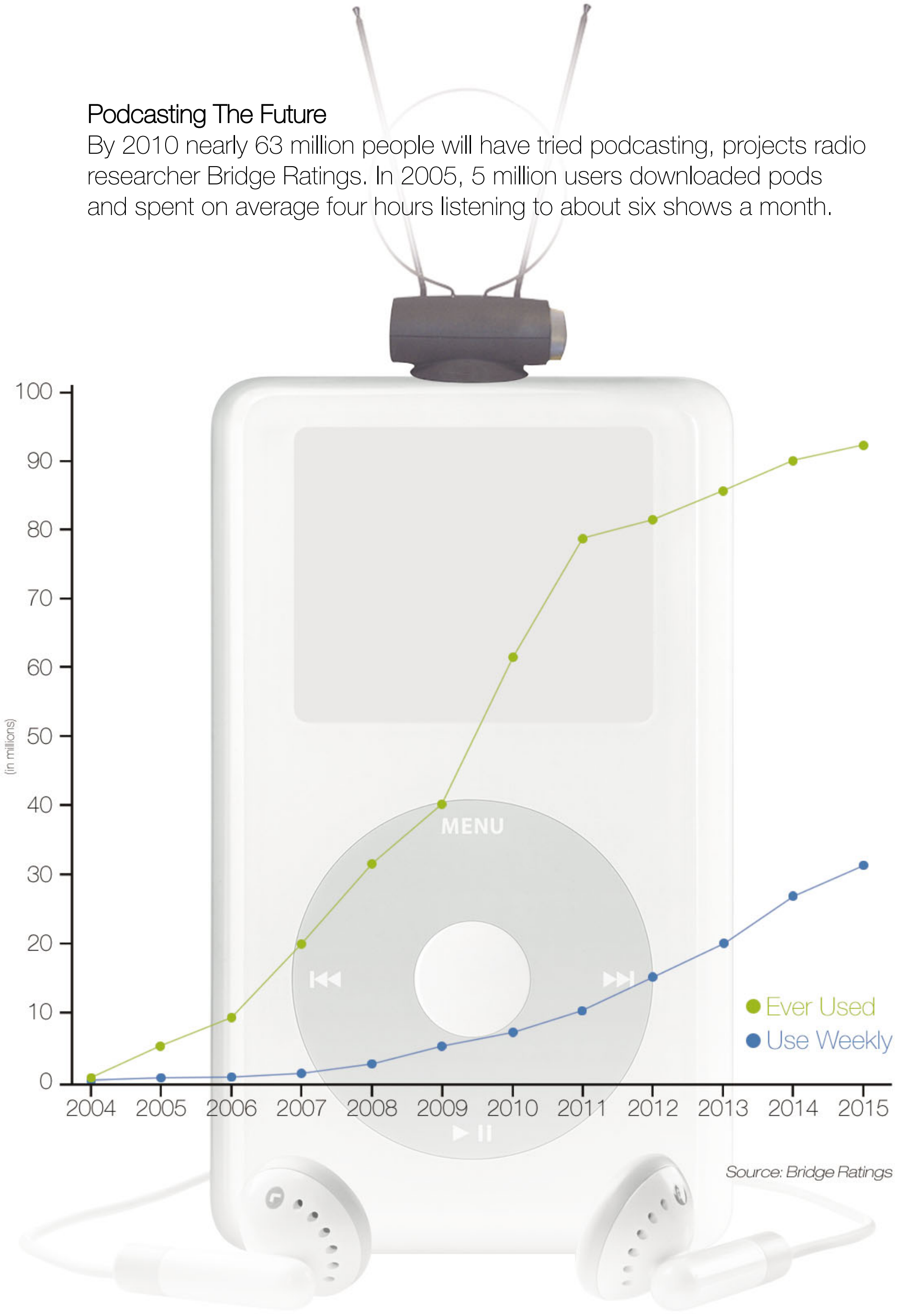
Atlas

12 p.m. (noon)

4 a.m.

Hour of the day when Web users are least likely to click an ad

Atlas



Podcasting The Future

By 2010 nearly 63 million people will have tried podcasting, projects radio researcher Bridge Ratings. In 2005, 5 million users downloaded pods and spent on average four hours listening to about six shows a month.

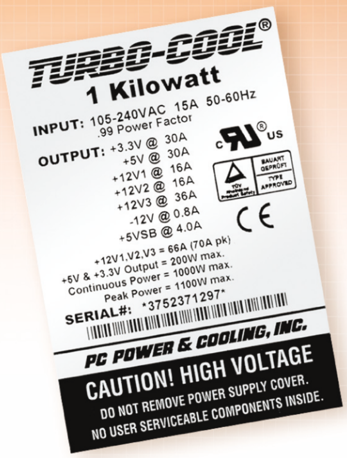
Source: Bridge Ratings

1 Kilowatt

of Pure Power!

Peak Power
is a Mind-Boggling
1100 Watts!

We built the Turbo-Cool® 1KW the way we've made power supplies since 1985 — with proven, upscale technology, uncompromised quality and conservative, honest ratings.



TURBO-COOL®
1 Kilowatt
INPUT: 105-240VAC 15A 50-60Hz
.99 Power Factor
OUTPUT: +3.3V @ 30A
+5V @ 30A
+12V1 @ 16A
+12V2 @ 16A
+12V3 @ 36A
-12V @ 0.8A
+5VSB @ 4.0A
+12V1,V2,V3 = 66A (70A pk)
+5V & +3.3V Output = 200W max.
Continuous Power = 1000W max.
Peak Power = 1100W max.
SERIAL#: *3752371297*
PC POWER & COOLING, INC.
CAUTION! HIGH VOLTAGE
DO NOT REMOVE POWER SUPPLY COVER.
NO USER SERVICEABLE COMPONENTS INSIDE.

c RU ® US
BAUART GEPRÜFT
TYPE APPROVED
TÜV
CE

Turbo-Cool® 1KW's Next-Gen Specs:

- 1000W Continuous and 1100W Peak
- Fits Std. ATX Cases (20″ min. depth)
- +12VDC Rails Total 66A (70A Peak)
- High Efficiency (85%) with .99 PFC
- Amazingly Quiet Cooling System
- Complete Array of Output Connectors
- EPS12V, SLI, and SSI Compatibility
- 5-Year Warranty; Unbeatable Support

Turbo-Cool 200 XT
1985

20 Years of Innovation

Turbo-Cool 1KW
2005

PC POWER & COOLING, INC.®

www.pcpowercooling.com • 5995 Avenida Encinas, Carlsbad, CA 92008 • (760) 931-5700 • (800) 722-6555

Specifications and pricing available on website. SLI is a trademark of NVIDIA Corporation. Turbo-Cool and PC Power and Cooling are registered trademarks of PC Power & Cooling, Inc. ©2005

Joining The Collective

by Alex St. John

Since *CPU*’s beloved founding editor Samit recently moved out here to Redmond, Wash., to join the Empire, I thought he might appreciate a little advice on how to fit in at Microsoft. I joined the Empire in January 1993, and although a lot has changed since then, several aspects of the culture remain unchanged.

First, don’t carry an umbrella; real softies gave up trying to be dry a long time ago. Embrace the rain, Samit.

Second, and this was tricky for me, you have to cultivate a “Microsoft Attitude.” This is the inner smugness that comes with the quiet sense of superiority you gain from your newfound association, however remote, with the richest and brightest men in the world. A proper “Microsoft Attitude” includes the assumption that nothing important in high tech happens outside of Redmond; customers, salespeople, and accountants are distant and easily forgotten evils; you know what all the confusing acronyms your co-workers use actually mean; and *you* are more environmentally righteous than anybody despite driving an SUV and owning a 6,000sq/ft house because you diligently recycle the plastic forks they use in the cafeteria. Because this attitude is so difficult to understand, it may help to try your hand at a few exercises:

When you arrive at work in the morning how do you greet your co-workers?

A) A smile and a cheerful greeting
B) A sullen nod
C) Bring donuts to share

Actually this wasn’t a fair question, as the correct answer is:

D) You slip into your office quickly and silently without making any visual or audible contact with your co-workers whatsoever. If confronted by a co-worker at any time, never break eye contact with your BlackBerry.

I told you this was tricky. Let’s try another. When attending a Microsoft meeting, do you:

A) Arrive late and declare the meeting an irrelevant waste of time because the issue was already resolved in a previous meeting with attendees who actually had a say in the matter
B) Forget the meeting because you were playing World of Warcraft
C) Spend the meeting browsing the Web on your laptop and sending emails to more important people
D) Make sure that you’re never the first participant to arrive because that would clearly indicate that you aren’t important enough to be too busy to waste your time with meetings

This was an easy one; the correct answer is of course any of the above.

Now that you’ve practiced a bit, let’s try a real challenge: When Bill Gates calls on your group to do a product review in front of him and Steve Ballmer, do you:

A) Show up on the appointed day and wing it
B) Diligently produce a detailed PowerPoint presentation on your group’s efforts and carefully rehearse your presentation until you can give it in your sleep
C) Rudely decline in email because you’re on a shipping deadline and don’t have time for their nonsense

This was kind of a sly one, because answer C was so very close; in fact, the correct response is:

D) Only produce the first three slides of your presentation, knowing full well that neither Steve nor Bill will let you finish a presentation before tearing into you with questions and challenges to your intelligence that can only be rebuffed by getting angry and telling them, “You don’t know what the hell you’re talking about, now stop wasting my time and let me get back to shipping a successful product for you!” at which point they are satisfied that you’re doing a great job

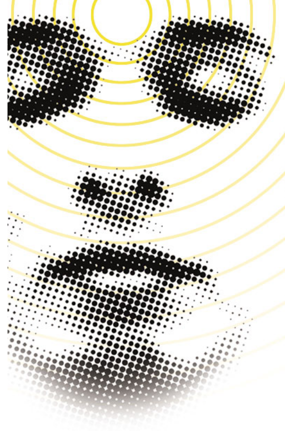
Finally, remember, Samit, Starbucks is your new best friend! ▲

Alex St. John was one of the founding creators of Microsoft’s DirectX technology. He is the subject of the book “Renegades Of The Empire” about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

A proper “Microsoft Attitude” includes the assumption that nothing important in high tech happens outside of Redmond . . . .

Send your feedback to TheSaint@cpumag.com

DREAM HARDWARE



These Gizmos Don’t Sing It, They Bring It

’Tis the winter of your discontent. Maybe some retail therapy can dispel your seasonal affective disorder. Should you buy a fake F-18 or a real ultra-light chopper? Or perhaps the blingiest geek gadget yet? If you’ve got the green, we’ve got the goods.

by Marty Sems

CPMT F/A-18E Simulator

The Pentagon’s loss is your gain. After being the first “Top Gun”-quoting brat on our block to run our Commodore 64’s F-15 Strike Eagle audio through a guitar amplifier, we strongly feel that you should invite us over to sit in your new $67,800 military flight simulator from Clark’s Precision Machine and Tool (www.clarksmachine.com/f18.html). You will get every switch, knob, and gauge in its correct place in the cockpit of an F/A-18E. (And later, possibly, a $100,000 to $150,000 F-16, F-22, or F-35.) Missiles, sensors—the software does it all. There’s a point to all this realism because the U.S. military used to buy these “micro” sims from CPMT. The P4 laptop-powered sim features a Sony projector and Klipsch 2.1-channel audio with a 10-inch subwoofer. You can even network to your buddy’s CPMT sim across town, so you’ll have a wingman for everything from aircraft carrier landings to combat in a blizzard.

Bonfort Swissmemoryprestige

What to pair with your bejewelled Vertu phone (September 2002 *CPU*, page 14)? What indeed? Ah, yes: a well-appointed USB 2.0 memory key from the Swissmemoryprestige line (www.bonfort.ch). This limited series from Bonfort, Swissbit, and Victorinox features protective housings of gold, silver, or white gold. Embedded diamonds are optional, as are customizations such as monograms. This isn’t a pocketknife like other Victorinox/Swissbit collaborations, just portable data storage guaranteed to incite obsequious envy and/or seething, class-conscious fury wherever you go. Actually, we’re counting the minutes until the thing’s first hip-hop video appearance. Prices range past $30,000, playa.

GEN H-4 Personal Helicopter

Whirling blades, teen-friendly controls . . . what’s the downside? Sure, we’ve lost several mailboxes over the years to young drivers, most of them even before the Great Cell Phone Plague. However, none of those postal casualties were ever chopped to bits on impact, nor did they send shattered rotors from the vehicle scything through our bay windows. GEN Corp. in Japan wants to change all that (www.gen-corp.jp, in Japanese). OK, we kid. The 155-pound coaxial, counter-rotating H-4 helicopter is for responsible pilot types. Your very own kit is hovering a mere $29,900 away at www.acecraftusa.com, although you’ll have a few training and licensing hurdles to fly over, too. ▲

3Gbps SATA Hard Drives

Plus, Why "SATA II" Doesn't Mean What You Think

Your next hard drive is tired of you calling it SATA II.

"SATA II" actually doesn't mean much—not even SATA 2.0. The reason people associate it with the latest hard drive technology is because SATA II was temporarily the name of the SATA-IO (Serial ATA International Organization), the working group responsible for developing the SATA spec. Of course, SATA II will probably stick around for a while as a blanket term for hard drives with 3Gbps signaling rates and, usually, NCQ (native command queuing).

Even "3Gbps SATA" isn't the proper name for the current technology. The latest specification is officially Serial ATA Revision 2.5, although few manufacturers advertise drives as SATA 2.5. A 3Gbps interface is the feature most power users want right now, so that's how I chose the drives for this roundup.

SATA's New Features

First, it's important to understand that all the following technologies are optional for SATA drives, even the 3Gbps interface speed. When you're shopping for a new drive, the main thing to realize is that it may not support all these unless the manufacturer individually mentions them. You can't even assume that devices billed as "SATA II" will have NCQ and 3Gbps. For example, Western Digital's Caviar SE16 does not have command queuing.

Furthermore, if the SATA controller on your motherboard or adapter doesn't support one of the drive's features, such as staggered spin-up, that technology won't be available to you. Many are only fully supported on server boards. Here's a brief look at the options that apply to hard drives.

3Gbps. Because most SATA controllers limit their ports to one hard drive per channel and current desktop SATA drives top out around 72MBps during sustained reads, it doesn't make much difference whether the interface

3Gbps SATA Hard Drives

Each of these 7,200rpm drives has a few strengths, but none stands out as the champ in every contest. It's interesting to note how well Seagate and Hitachi take advantage of the 3Gbps interface's burst rate potential. For the sake of comparison, I've thrown in a 1.5Gbps, 10,000rpm Raptor. Specs such as access time may vary with capacity within certain drive families.

Drive	Hitachi Deskstar 7K500 500GB	Samsung SpinPoint SP2504C 250GB	Seagate Barracuda 7200.9 500GB	Seagate NL35.2 500GB	Western Digital Caviar SE16 250GB	Western Digital Raptor WD740GD 74GB
Interface	3Gbps SATA	3Gbps SATA	3Gbps SATA	3Gbps SATA	3Gbps SATA**	1.5Gbps SATA
Spindle Speed (rpm)	7,200	7,200	7,200	7,200	7,200	10,000
Cache Buffer (MB)	16	8	16	16	16	8
Avg. Read Seek Time, Advertised (ms)*	8.5	8.9	11	11	8.9	4.5
HD Tach 3.0.1.0 RW						
Read avg/max (MBps)	51/65	59.3/71	50/65	53.3/69	53/62	65.1/72
Write avg/max (MBps)	48.5/63	57.3/69	45.8/59	47.1/63	51/60	63.6/70
Burst read (MBps)	223.5	190.6	247.8	234.8	171.1	127.2
Random access (ms)*	17.2	19.9	14.6	15.8	13.5	8
IOmeter 2003.5.10 (I/Os per second)						
File server	95.33	105.48	92.29	86.4	103.21	184.04
Web server	132.72	119.29	114.71	112.34	119.73	220.87
CPU utilization file/Web (%)*	4.49/4.85	4.59/4.81	4.51/4.55	4.74/4.8	4.79/4.6	4.66/5.42
PCMark05 Pro 1.1.0						
Hard Drive Overall	6439	5339	5028	4961	5847	6587
WinXP Startup (MBps)	10.1	8.6	8.5	8.3	9.7	10.4
General Usage (MBps)	7.5	5.7	5.9	5.7	7.1	8.5

* Lower is better. ** No command queuing.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

can handle 150MBps (a 1.5Gbps interface's theoretical maximum transfer rate using 8/10 encoding) or 300MBps (3Gbps). It's like building a highway for 200mph racing but most cars can't go faster than 100mph. Right now, 3Gbps is more of a future-proofing technology than a necessity.

"All along, hard drive manufacturers have always increased their interface speed before the data throughput reaches [it]," says Seagate's Joni Clark, a member of SATA-IO. "The interface shouldn't be the bottleneck."

There are exceptions, of course. Several current SATA bruisers have big 16MB cache buffers, compared to 8MB or 2MB in other drives. A big cache means a better chance that data will already be in the drive's memory, rather than having to be read from the hard disk(s), and therefore transmittable at the burst rate of 300MBps (actually between 171MBps and 247MBps in my tests). The other exception comes into play when a controller can connect two drives on one channel to aggregate bandwidth, such as parallel ATA/IDE does with two drives per cable. This port multiplication is transparent to the user in SATA, Clark says, as the controller simply connects two-to-15 headers to one channel. The SATA cables remain the same at one per drive in contrast to a two-drive PATA cable.

3Gbps vs. 1.5Gbps

Consistent with what drive manufacturers say, a 3Gbps interface doesn't bring a huge performance gain to the table for the vast majority of desktop hard drive users. This single Seagate drive doesn't lose much by dropping down to 1.5Gbps. In fact, certain operations may actually gain a little speed. For now, 3Gbps just means a higher speed limit for the future's faster drives.

Seagate NL35.2 500GB SATA 2.5		
Interface Speed	3Gbps	1.5Gbps
HD Tach 3.0.1.0 RW		
Read avg/max (MBps)	53.3/69	53.3/69
Write avg/max (MBps)	47.1/63	45.4/59
Burst read (MBps)	234.8	124.2
Random access (ms)*	15.8	16.1
IOmeter 2003.5.10 (I/Os per second)		
File server	86.4	91.39
Web server	112.34	112.55
CPU utilization file/Web (%)*	4.74/4.8	4.6/4.5
PCMark05 Pro 1.1.0		
Hard Drive Overall	4961	4652
WinXP Startup (MBps)	8.3	8.2
General Usage (MBps)	5.7	5.5

* Lower is better.

Two SATA drives sharing a channel might saturate a 1.5Gbps link, especially if such advances as perpendicular recording (subscribers can read the "Getting Perpendicular" sidebar at www.cpumag.com/cpufeb06/harddrives) help drives read at faster rates. A 3Gbps interface with double the bandwidth would avoid such a bottleneck.

NCQ. NCQ debuted in many 1.5Gbps drives as a refinement of earlier CQ schemes used in SCSI drives. When a supporting controller sends NCQ-enabled commands to a drive, the drive will intelligently prioritize up to 32 of those commands before performing the reads/writes. Because the controller triggers CQ, the user can enable/disable it in the OS, as from Windows XP's Device Manager. Clark says that applications that take advantage of the multithreading features of dual-core and/or Hyper-Threaded processors should complement NCQ for faster throughput.

Staggered spinup. Hard drives draw much more power at startup to get platters spinning than they draw to keep them rotating during operation. In multidrive servers and RAID 0+1 desktops, that can mean a pretty big electrical hump for the PSU to get over. Staggered spin-up, as supported by the controller, starts up drives at slightly different times to spread the load.

Hot-plugging. Hot-plugging, another longtime feature, is still recommended for server enclosures more than desktop PCs. The reason, Clark says, is that while you may be able to disconnect the drive from a running system at any time without dismounting it, the OS and controller must fully support hot-plugging, too. If there's any caching enabled in the OS or controller, for instance, cached data could be lost without at least dismounting the drive. Look closely at the staggered electrical contacts in SATA cables and you'll see that the ground lines connect first and disconnect last to avoid problems during hot-plugging.

Pin 11 LED. It's well and good to have a nearline storage enclosure that can survive a drive failure, Clark says, but sysadmins asked for an indicator as to which drive has died. Pin 11 was added to the SATA spec as a jumper block that can trigger an LED when a drive fails.

Physical event counters. This feature can inform drives that a connected system has gone offline or shut down unexpectedly, Clark says, so the drive can decipher what to do with unresolved data requests. This can also help a drive prioritize the commands it's queuing, especially if some were from the dead host.

Port selection. If two computers are connected to one SATA storage enclosure, and one system goes offline, a controller supporting port-selection will automatically fail-over the SATA enclosure to the remaining host. Unlike SAS (Serial Attached SCSI) and its "active/active" approach, Clark says, SATA's "active/passive" port selection can only make this switch when a host fails or goes offline.

Spread spectrum clocking. 3Gbps means doubled interface speeds, which also means greater signal noise and electromagnetic emissions. As in the processor settings in many motherboards' BIOSes, spread spectrum clocking can reduce emissions to meet regulations.

"In a single-drive environment, it's not necessary," Clark says, "but when you've got two or more drives, and they're all running at 3Gbps, that's when you've got a lot of electrical noise going on," and the spread spectrum feature is recommended.

Deskstar 7K500
$379.99
Hitachi
www.hitachigst.com

SpinPoint SP2504C
$115
Samsung
product.samsung.com

Clark says this is more for safety than reducing data errors, which most drives' ECC code will correct automatically.

ClickConnect. Some manufacturers designed changes into their drives and cables to make their connectors stronger and less likely to pull out accidentally. This meant a bevy of proprietary designs, so the SATA working group standardized ClickConnect, a connector that latches like a LAN cable with a broader tab.

eSATA. More of a cable and connector redesign than a fundamental change, eSATA means data cables with better shielding and connectors that are harder to accidentally dislodge or break. The external drive's power is still supplied separately. eSATA headers are rectangular instead of L-shaped, so eSATA cables won't work inside most PCs. The working group came up with eSATA to address the fact that users were already connecting SATA drives externally because the interface outpaces USB 2.0 and FireWire 800Mbps. Shielding that was adequate for use inside a computer case, Clark says, wasn't good enough outside the box.

xSATA. This option allows the use of much longer external data cables of up to 8 meters in length.

How We Tested

I tested each drive singly on a fully updated system with an Athlon FX-55 (2.6GHz/1MB of L2 cache), 1GB (2 x 512MB) of OCZ Gold EL PC4400 DDR at 400MHz/2.5-4-4-8, a 1.5Gbps Western Digital Raptor 74GB, and Windows XP Pro SP2. The Nvidia nForce4 chipset on our DFI LANParty NF4 SLI-DR mainboard provided the 3Gbps/NCQ SATA controller. I also checked the controller's properties in Device Manager to ensure that each drive was set for 3Gbps speeds, with CQ and caching of reads/writes enabled as available.

First, I tested each unpartitioned drive's sequential performance and access times with HD Tach RW 3.0.1.0's Long Bench (32MB zones) test. Next came two custom tests in IOMeter 2003.5.10 to gauge each drive's ability to manage queued requests in server access patterns. My File Server profile simulated a load from one user with 16 outstanding I/Os, and my Web Server test emulated accesses from four users with 16 outstanding I/Os each, for a total of 64. Finally, I formatted the drive as a single NTFS partition with 16KB clusters and ran PCMark05 1.1.0's hard drive tests solely on the drive in question.

Keep in mind that performance differences between current drives with similar specs will be practically unnoticeable during everyday use in a single-user system. Once you consider accesses from multiple users on a regular basis, then access times, CQ, and cache size and management will play greater roles. Multithreaded apps may also make this issue more important in the future. Also note that smaller-capacity drives within a particular family may have faster seek times, lower noise ratings, different cache sizes, and even different interface speeds than the biggest models.

Among makers offering 3Gbps, 3.5-inch drives, only Maxtor was unable to take part here. (At press time, Seagate had reportedly agreed to purchase Maxtor.) Prices are the lowest found at top-tier online resellers. And although I benchmarked a second WD Raptor for comparison, I excluded that 10,000rpm drive from the test result rankings. When you see something like, "The Caviar SE16 had the fastest access time," mentally add, "except for the Raptor."

Hitachi Deskstar 7K500

The 7K500 was the first drive to ship with half a terabyte, despite Seagate's 500GB NL35 announcement a year earlier. The 7K500 was PCMark05's clear favorite among this 7,200rpm flock, almost matching the 10,000rpm Raptor's scores. This Deskstar also won IOMeter's Web Server competition.

Supporting NCQ and staggered spin-up, the 7K500 also features Hitachi's Smooth Stream technology for better audiovisual playback. Hitachi says the 7K500 can only withstand 225G (gravities) of a 2ms shock while powered down, making it relatively vulnerable during installation and transport. I'd call this indicative of a five-platter drive, along with its unqualified 31dB noise rating (to adjust acoustics against seek performance, you can download Hitachi's Feature Tool

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Barracuda 7200.9
$349
Seagate
www.seagate.com
CPU CPU CPU C

NL35.2
$384
Seagate
www.seagate.com
CPU CPU CPU C

(Same drive as 7200.9, but with firmware)

1.99 at www.hitachigst.com/hdd/support/download.htm). The drive has a three-year warranty.

Samsung SpinPoint SP2504C

This SpinPoint's speed may surprise a few folks, but I've long found recent Samsung drives often meet or beat the competition. The only real hurdle is an image problem. Before a major revamp years back, Samsung's drives were pretty spotty. Today, you get a 350G shock tolerance, five-year lifespan rating, and three-year warranty.

The 3Gbps SP2504C, part of the 125GB/platter SpinPoint P120 Series, tops out at 250GB with an 8MB cache. Fewer platters help it nab low 25dB idle and 28dB read/write acoustic ratings, but a slow 19.9ms random access time reveals the rest of the price paid. Still, densely packed data helps it return top read/write rates and IOMeter File Server performance.

The SP2504C supports regular SATA connectors, plus ones with a latching ridge on top. You can lock the interface at 1.5Gbps with a jumper. The drive uses NCQ and supports SATA's power-management and staggered spin-up. Then there's that new 400GB, 3Gbps SpinPoint HD400LJ. . .

Seagate Barracuda 7200.9

Seagate pioneered stealth drives, so its 7200.9's 28dB idle/32dB seek noise rating—low for a four-disk, half-terabyte drive—is no surprise. Nor is its tough 350G shock tolerance. The five-year warranty is a welcome rebuttal to the short coverage periods of drives released a few years ago. And the 7200.9 line's density is outstanding at 160GB per platter, although this 500GB model's disks hold 125GB each.

This Barracuda's long 11ms advertised seek time may indicate that Seagate places priority on quieter drives and sequential retrieves, such as video and audio. However, the 7200.9's actual access time was second only to the WD SE16's. The drive had the fastest burst read rate and placed or tied for third in HD Tach's max read rates and PCMark05's General Usage tests. Still, this Barracuda's forte is quiet reliability.

Seagate NL35.2

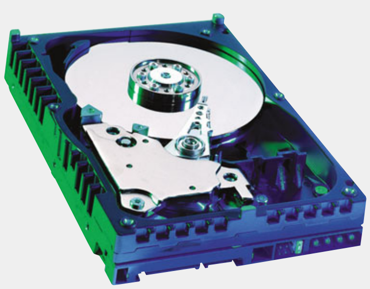
Launched as we went to press, the NL35.2 is simply a Barracuda 7200.9

The Raptor Rapture

Western Digital's idea for desktop drive supremacy was simple: While it was converting 7,200rpm IDE drives to SATA anyway, why not refit a low-end SCSI drive to the same interface? The resulting Raptor made a huge splash among desktop speed freaks in 2003 with its 10,000rpm spindle speed, and you can still see the ripples in our 74GB version's test scores. Lower latency makes possible a 4.5ms access time, less than half that of its 7,200rpm foes.

The Raptor's most glaring drawback has been its very low capacity-per-dollar ratio, a legacy of its SCSI roots. For a little more cash, two 7,200rpm drives in a RAID-0 will be vastly bigger and faster in several areas. The Raptor is also more audible than most 7,200rpm drives, although it stays fairly cool in use. Its uses TCQ (Tagged Command Queuing) instead of the slightly more efficient NCQ and has a 1.2 million-hour life expectancy and a five-year warranty.

WD was expected to announce some changes to the Raptor after this issue went to print, so WD couldn't be specific about what those updates might be. I'm guessing bumps to 3Gbps and at least 147GB, but staggered spin-up and other SATA 2.5 options would be welcome, too. While I'm fantasizing, why not a 15,000rpm version bundled with a bay-mounted drive cooler? Sigh.



Raptor
$160 (74GB WD740GD)
Western Digital
www.westerndigital.com
CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

with tweaked firmware. It's optimized for nearline storage applications as opposed to desktop duty, so although it's a SATA drive, it's at home in SAS systems. (See the "October 05 Issue Feedback & Questions for Editors" thread in the *CPU* The Mag & Site forum at www.cpumag.com for test results from the SAS Cheetah 15K.4.)

"SATA and SAS can work together on the same bus as long as it's a SAS-based controller/system," says Seagate's David Szabados. "SATA and SAS are not compatible if you're trying to tie them into your SATA port . . . on your non-enterprise motherboard."

The NL35.2 gets a 1-million hour MTBF rating because of its build tolerances and testing. My NL35.2 did pretty well in HD Tach, but 24/7 reliability is its real aim.

Caviar SE16
$115
Western Digital
www.westerndigital.com
CPU CPU CPU CPU

Western Digital Caviar SE16

There's a 400GB SE16, but it doesn't have this 250GB version's 3Gbps interface. Like Samsung's 250GB SP2504C, this three-disk SE16 enjoys a small performance advantage over the 500GB drives here because it has fewer heads to move around. It placed second among 7,200rpm models in most tests but won the access time race at 13.5ms.

The SE16 doesn't have official CQ, but as our chart shows, it does fine in a single-core, single-threaded environment. Its five-year warranty, 1.2-million hour MTBF, and 28dB idle/33dB seek noise ratings almost match Seagate's NL35.2. You can enable Spread Spectrum Clocking or specify 1.5Gbps mode via jumpers. In a RAID WD's time-limited error recovery may boost throughput a bit.

This Caviar can use WD's proprietary SecureConnect cables featuring an ultra-beefy connector. Unfortunately, SecureConnect only fits certain WD drives, and there was no power cable integrated with my sample cable, even though the connector covers both SATA data and power ports. I had to use the Molex jack to power the drive.

Tough Call

No 7,200rpm drive really stands out as the best at everything in our benchmark results. In fact, I couldn't even make sophomoric correlations between, say, low access times and high IOMeter and PCMark scores. Hitachi's 7K500 gets my nod for performance, with the WD SE16 and the dark horse Samsung SP2504C next. The Samsung is also the quietest drive here, while the WD SE16 and Seagate NL35.2 seem fittest for continuous duty. ▲

by Marty Sems

Subscribers can see bonus information on the future of hard drives at www.cpumag.com/cpufeb06/harddrives.

SATA Rising

The SATA-IO group is working on a slimline specification for mobile drives, scaling down SATA's connectors for the thinner, smaller form factors of notebooks and portable electronics. Also, link power management in the current standard has already addressed a power consumption problem that has kept SATA from penetrating the notebook market. Initial SATA drives required a continual clock signal, unlike parallel ATA/IDE drives. This constant power draw made SATA impractical for battery-powered devices. Link power management allows SATA 2.5 drives to support power-saving sleep states.

Future innovations that could improve capacities include tilted perpendicular recording, which involves orienting bits to stand diagonally in the recording layer. In the shorter term, Samsung says that its new TMR (tunneling magnetoresistive) heads will facilitate its initial, non-tilted perpendicular recording designs.

Patterned media, meaning hard disk media formulated with smaller, more distinct grains, is another technology that could be beneficial to capacity. Still another is heat-assisted magnetic recording, such as Seagate's HAMR. The idea is that bits that would be difficult to flip at operating temperatures can be changed more easily when momentarily heated by a laser, leaving nearby cooler bits undisturbed.

Progress is also being made toward increasing the standard 512-byte physical sector size on the media and interface of hard drives to 1KB to 4KB (www.bigsector.com). The change should allow greater data reliability, efficiency, capacity, and performance (about 3% to 9%, according to Seagate, Maxtor, and Western Digital). Of course, file systems, BIOSes, OSes, and applications would all have to take any changes into account. Also, bigger sectors might rule out backward compatibility for new drives.

Finally, Seagate's Joni Clark says, 6Gbps SATA might arrive in the 2008-to-2009 timeframe. Because flash memory still can't match their speed and capacity for the money, hard drives become more rather than less important each year. In our world of HD time-shifting, music file libraries, and monster databases, it's nice to know that drive manufacturers are setting the pace.

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

VoIP Gear Is Finally Here

Eight Ways To Keep Talk Cheap

Doing a VoIP phone roundup is a little trickier than you might expect. Most VoIP systems are now based on SIP (Session Initiation Protocol), in many ways the successor to the H.323 protocol that really kicked off the VoIP movement. SIP was first devised as a draft spec in 1996 as a way to create, manage, and terminate online multimedia sessions, music in particular. As it evolved, though, SIP proved to be a handy medium for achieving some traditionally phone-like functions, such as establishing a user's location on the network and adding, dropping, and transferring participants from a call.

SIP is an IETF (Internet Engineering Task Force) standard. Unfortunately, though, the ways in which carriers can implement SIP are not standardized. Some carriers implement an "open," or cross-compatible, SIP architecture; others, such as Vonage and Skype, render their systems incompatible with other services. Moreover, just like with cell phones, carriers can key SIP-based devices to different carriers. I wanted, for example, to try out VTech's ip8100 5.8GHz cordless VoIP phone system, but it's tweaked to work only with Vonage. Some phones are keyed for Lingo, and so on.

Ultimately, I decided to aim for the broadest possible consumer VoIP platform that didn't necessarily tie me to a fee-based subscription service, and that meant Skype. To test, I snagged my trusty Sennheiser PC 160 Pro-Gaming headset, which was a bit overkill for VoIP but provided a good subjective benchmark. I also ponied up $20 for Skype-Out credit, letting me not only make Skype-to-Skype calls with a handful of guinea pigs around the country but also Skype-to-cellular and Skype-to-POTS (Plain Old Telephone Service) calls. Up front, I'll say that Skype-to-cellular sounds terrible. Even when the connection is ungarbled (odds of this seem about 50/50), fidelity is so poor that call participants are often only semi-intelligible. Skype-to-POTS calls are better, sounding more on par with conventional cell phone calls, only a bit more distant.

The fact is that while Skype-to-Skype is still prone to occasional disconnects and connections with hopelessly mangled line quality, most calls are solid and shockingly clear—much clearer and with broader fidelity than landline calls. In any event, I spent several hours getting accustomed to how calls sounded on the Sennheiser headset. When testing I would start with a headset call and then call back multiple times with the VoIP product in question.

This is a crazy product category in rapid transition. My guess is that two consumer VoIP hardware models will emerge over the next couple of years: use of a headset or speakerphone for PCs and converged wireless handsets able to seamlessly leap between Wi-Fi and cellular networks. Last year, Infonetics Research said that such dual-mode wireless phones totaled only $6.7 million in sales during 2004, but rapid growth is expected by mid-2006 as reception distance, network roaming, and QoS issues get solved. Between now and someday, though, consider the following units for your foray into VoIP.

CLA-i750H
$109.99
Clarisys
www.clarisys.com
CPU CPU CPU CPU

Clarisys CLA-i750H

Given the constraints of my testing setup, the i750H's only major flaw was that it's not optimized for Skype. The handset is geared for softphones from 3Com, Avaya, Cisco, eyeP Media, Xten, and others, but these reflect Clarisys' emphasis on business environments, although it also supports old-school consumer VoIP apps such as Net2Phone and Dialpad. The i750H works with Skype as a basic handset and speakerphone, but you don't have as much functionality. For example, the arrow buttons don't navigate the Skype UI, and I couldn't find any way to adjust the speakerphone volume.

Clarisys bundles in its own driver software, which drops an icon in the system tray, and there's not much to say about this other than that it defaults to wanting to use MSN Messenger for VoIP calling. You can add any VoIP app you like to the launch list of shortcuts, but it's not obvious how to do this.

The i750H is almost 8 inches long owing to its extended microphone.

HNT1 Net-Talk USB Internet Phone

$59
Hawking
www.hawkingtech.com

CPU CPU CPU

This comes in handy when in use as a speakerphone; speakerphone tests were remarkably sensitive and clear, but I had to be careful when in handset mode to keep the mic out of the wind stream of nose exhalation. The phone's back is flat and rubberized to keep it steady as a speakerphone. I wish Clarisys would have made the USB cable emerge from the bottom rather than the top of the back for more convenient handset use, but this is a small point given the unit's excellent overall sound quality.

Hawking HNT1 Net-Talk USB Internet Phone

So small and light that it seems more toy than tech, the HNT1 is another USB-based VoIP handset. But unlike the i750H, Hawking opts for a plug-in mini-USB port, which is a smarter choice for notebook bags and such, plus it helps keep the cost down. Hawking's software does optimize the HNT1 for Skype, and the performance difference before and after installation is substantial, both in feature support, as well as sound quality. Note that Hawking also tailors the HNT1 for other popular consumer VoIP apps, including AIM, Google Talk, MSN Messenger, Yahoo! Messenger, and others.

During my first test call, the receiving party reported hearing a slight echo that soon faded away and never returned on subsequent calls, all of which were very solid. The HNT1 sports 1/8-inch headphone and mic jacks on its side, so I plugged in the Sennheiser PC 160s and was impressed to find that there was no discernable sound difference between using them through the HNT1 vs. straight into the sound card. (Audio does become more muted and distant when talking and listening directly through the handset, but it's still decent.) However, this got me wondering: If the best results from the HNT1 are had via an add-on headset, why not just use a headset and skip the USB phone? Sure, you can control Skype with the dial pad, but a mouse is quicker. The i750H at least has a speakerphone aspect. Despite its solid quality, the fact is that if you don't mind headsets, the HNT1 has little value of its own to offer.

Iogear USB Speaker Phone

Right on the heels of reviewing the Hawking phone, Iogear answered my value question. VoIP on the desktop is either going to emphasize quality, in which case you want a good headset, or convenience, which is when a speakerphone becomes handy. Opting to target the latter, Iogear released the USB Speaker Phone, a palm-sized unit with a mini-USB plug and a headphone port for times when you might need a little privacy. The integrated DSP proved able to eliminate any echoing, and Iogear says that the unit is compatible with a wide range of IM and gated VoIP apps, including Vonage and Webex.

My first call with the USB Speaker Phone was garbled, but this was likely a Skype congestion issue as all subsequent calls were solid and distortion-free. Audio grew a bit distorted at the maximum volume; about a 75% volume setting was just right and still plenty loud for a small room. Smart and inexpensive, this unit is a surefire hit for hotel hoppers.

USB Speaker Phone

$49.99
Iogear
www.iogear.com

CPU CPU CPU C

Internet Telephony Kit (CIT200)

$129.99
Linksys
www.linksys.com

CPU CPU CPU CPU

Linksys Internet Telephony Kit (CIT200)

Specifically for Skype use, this is my favorite product of the bunch. The kit includes a USB base station, charging cradle, and 1.92GHz cordless handset.

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Premium USB Headset 350
$49.99
Logitech
www.logitech.com
CPU CPU CPU

You install a little driver applet for Windows, tell Skype to work with the CIT200, and that's it. The phone fetches your Skype contact list along with the contacts' status and profiles. Linksys' color LCD display is much easier to read than the mono LCDs from, say, Clarisys or Hawking, and the reception is phenomenal. A known Wi-Fi dead spot in my building about 40 feet and three walls from my router (in the restroom) was no problem for the CIT200. Even better, call quality was excellent. Skype-to-Skype calls were crystalline, and calls to landlines sounded like top-notch cellular calls.

The only glitch I hit was the discovery that Linksys' driver plus Skype 1.4 plus my system's 3.6GHz Pentium 4 CPU were incompatible; the phone wouldn't interface with Skype. Linksys told me that there was a known bug between Skype 1.4 or higher and 3GHz-plus chips. However, because none of the other VoIP gear I tested had this problem, I have to assume that Linksys' driver is mixed up in the mess. When I uninstalled 1.4 and downgraded to 1.3, the problem vanished.

The base station will coordinate up to four CIT200 handsets, all of which can communicate in intercom fashion and can double as speakerphones. You get caller ID, call waiting, and up to 10 hours of talk time with the two AA rechargeable batteries (batteries included). Linksys even throws in a coupon for 60 SkypeOut minutes. Driver incompatibility aside, the only niggling problem here is the lack of any POTS support, which shouldn't be a terribly hard feature to include via the base station. For Skype-only use, though, the CIT200 is outstanding.

Logitech Premium USB Headset 350

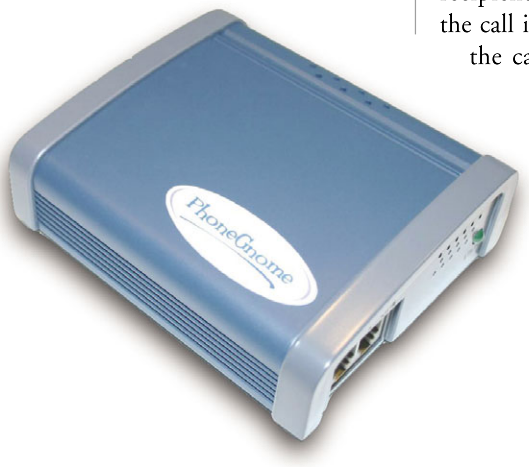
I'd like to see Logitech come out with a real premium edition of its USB headset because this version felt rather average to me. Perhaps I'd grown jaded after days of testing. On Skype-to-Skype calls, the overall audio quality between two 350 sets (one of my receiving testers bought one at a store) was still considerably better than a POTS-to-POTS call. However, the cost-cutting measures became apparent when switching from the 350 set to my Sennheisers. Listeners noted that the Logitech headset sounded more muffled, that the speaker had lost that "in your face" presence a high-end headset offered, and that the quality was more like a good cell phone connection.

On first wearing, the 350 seemed stiff, but it actually proved comfortable after a minute or two. The swinging mic boom seemed to be too far from my mouth, but I found that bringing the mic over to the corner of my mouth made no difference to the listener. There's also more discernable static hiss, although it remains faint. Curiously, my test listener who was on a POTS line reported being able to hear his own echo as the 350's mic picked up his voice from the left earphone. No such echo was heard on my Skype-to-Skype calls.

Overall, this is a good sub-$50 VoIP headset, but it does show that you get what you pay for.

TelEvolution PhoneGnome

One highly publicized downside for some VoIP services is that they have yet to integrate emergency 911 features. (SomeVoIP carries have recently adopted emergency calling capabilities.) This is the entry point for understanding why PhoneGnome—a little box that sits between your router, wall phone jack, and analog phone—is a killer product. Rather than try to replace your POTS service, PhoneGnome works on top of it, intelligently sensing which calls are being placed to another PhoneGnome or a compatible, open SIP service (such as Free World Dialup, Gizmo Project, EarthLink, and Google Talk) and routing compatible calls via VoIP. If the call recipient isn't on an open SIP service, the call is routed either via POTS or, in the case of long-distance calling, an IP-based LD provider the user selects. In fact, you can configure multiple



PhoneGnome
$119 (single); $199 (2-pack)
TelEvolution
www.phonegnome.com
CPU CPU CPU CPU

CPU Ranking: ☐ 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

IP LD providers based on which offers the best rates to given geographic areas.

In testing, I called TelEvolution's founder using my office's ordinary cordless phone run through my PhoneGnome at both his home POTS and PhoneGnome IP lines. The two calls were virtually indistinguishable in terms of line quality. There was a faint metallic edge on the IP line if we listened really hard for it, but otherwise the quality was impeccable with no discernable QoS drops. Better yet, once you register your box at my.phonegnome.com, you can change device settings, monitor your call history and statistics, and add in free features, including call blocking, telemarketing screening, basic voicemail, and voice-mail-to-email (WAV file) forwarding. Premium, fee-based services are also available. PhoneGnome is truly a best-of-both-worlds deal and deserves to be one of the hot consumer VoIP products of 2006.

Soyo Z-Connect G668 VoIP Phone

Soyo's foray into VoIP seeks to bridge the corporate and consumer product spaces. The G688 is a SIP-, H.323 V4-, and Net2Phone private protocol-based device that looks much like a corded office phone but sports an RJ45 jack rather than RJ11. Forget PCs and just plug it straight into a router. DHCP read my G688 without a hitch. Pressing the phone's Local IP button told me it was on 192.168.1.7, so I used a browser to access the password-protected page and proceeded to twiddle with the network and port settings, changed the password, and checked for firmware upgrades. I wish Soyo would take a page from TelEvolution and build more functionality into the device, but there's always the next version.

The good news is that the G688 delivers solid service. Using a seven-digit number, I called a representative at Soyo

Z-Connect G668 VoIP Phone
$139
Soyo
www.soyousa.com
CPU CPU CPU

VoIP Broadband Phone Services

Provider	Plan Name	Monthly Base Rate	Unlimited To	Toll-Free Support?
BroadVoice	Unlimited World	$19.95	U.S. + 20 countries	No
Comcast	Digital Voice	$39.95	U.S. + U.S. territories	Yes
deltathree iConnectHere	iCall Unlimited	$29.99	U.S., in-network	No
SIPphone	Gizmo (softphone)	Free ($0.01/min to U.S.)	In-network	No
Lingo	Unlimited Home Plan	$19.95	U.S., in-network, Canada, Western Europe	Yes
USA Datanet	All Talk Rate Plan	$24.95	U.S. + Canada	Yes
VoipBuster	VoipBuster (softphone)	Free	U.S. + 15 countries	No
Verizon	VoiceWing Unlimited	$34.95	U.S. + Canada, in-network	Yes
Vonage	Premium Unlimited	$24.99	U.S. + Canada	Yes

* Rates in Eurocents

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

who also had a G688. The connection was respectably clear. I heard no jitter or latency problems. Voices had a rough edge to them, but not enough to impair intelligibility, and there was a faint whooshing sound in the background. Overall, the quality was good. Unfortunately, because the PC is cut out of the loop, the G688 can only call other Soyo Z-Connect phones. If you're OK with the idea of a closed phone network—maybe you don't want users calling nonapproved people—then this is a good deal. Otherwise, it may be too restrictive for consumers.

ZyXEL Prestige 2000W

This Wi-Fi VoIP handset earns praise not so much for what it is but for what it's ushering in. Just looking at it, the P-2000W carries a late '90s cell phone demeanor, only a bit lighter and flimsier feeling. The idea is that the phone taps your router or access point, obtains an IP address, and dials through a third-party VoIP service out into the digital or analog worlds. It operates like a regular phone, area code dialing and all.

I immediately hit a snag with setup when trying to follow the manual and had to call ZyXEL. Techs there were immensely helpful and guided me through additional confusion with the phone's internal Web-based setup page. They provided me with a VoIP service account (often, the phone sells with a service bundle) and told me what values to enter. Hopefully such bundles are better documented because figuring it all out from scratch wouldn't be fun.

During testing (conducted at the 64K bit rate option, not 8K), phone quality came in somewhere between a landline and a good cellular call. Sometimes there was a slight gurgling, and I heard a persistent background hiss. There were no echoing problems, but occasionally calls would go through periods of bad stuttering and line congestion or interference. This would affect one or both callers and sometimes become so bad that I had to hang up and call back. Clearly, ZyXEL needs to improve QoS at several points throughout the IP chain. Thus, ZyXEL has given us a taste of what to anticipate in wireless communications, but the P-2000W is clearly not there yet. ▲

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by William Van Winkle

Prestige 2000W
$169
ZyXEL
us.zyxel.com
CPU CPU CPU

Rate To London	Rate To Beijing	Rate To Saudi Arabia	Cool Perks
Covered	Covered	$0.26/min	Outlook integration, simultaneous ring, three-way calling, voicemail, softphone support, call manager
$0.08/min	$0.15/min	$0.47/min	Voicemail with Web access, keep analog phone, three-way calling, caller ID
$0.02/min	$0.025/min	$0.24/min	Web voicemail, softphone, caller ID, three-way, 411, free analog phone adapter, online account management
$0.03/min	$0.06/min	$0.26/min	Call quality indicator, IM, call subject field, call location mapping
covered	$0.04/min	$0.21/min	411, emergency calling, caller ID block, universal number, simultaneous ring
$0.089/min	$0.069/min	$0.449/min	Free virtual number, emergency calling, keep current number, Web voicemail
$0.01/min*	$0.01/min*	N/A	Speed dial
$0.03/min	$0.064/min	$0.266/min	Caller ID, Web voicemail, fax capability, call blocks, simultaneous ring, three-way calling
$0.04/min	$0.06/min	$0.23/min	Keep phone number, free phone adapter, three-way calling, Web voicemail, 911 dialing

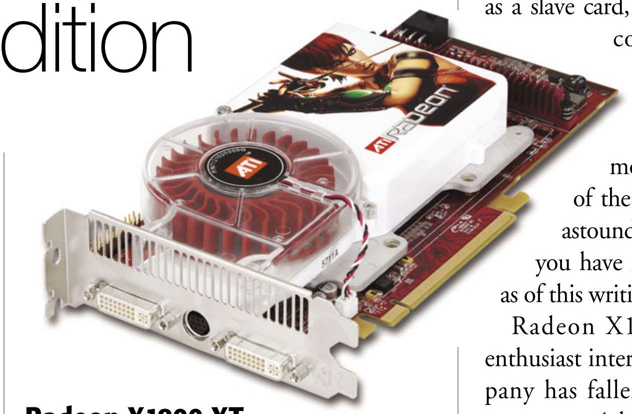
CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

ATI Radeon X1800 XT CrossFire Edition

I was a little rough on the Radeon X1800 XT when ATI first announced it. Even after months of delays, availability just wasn't there yet. Performance merely matched Nvidia's competing card and nobody at ATI seemed to know when CrossFire would be ready. Times have certainly changed, though. The company is shipping plenty of X1800 XT hardware along with the derivative Shader Model 3.0 boards. Even the multimedia team is getting in on the action thanks to the All-In-Wonder Radeon X1800 XL. But no way did I expect CrossFire hardware before the end of 2005.

Could it be that ATI is back on track? The Radeon X1800 XT CrossFire Edition is ready for prime time and it just works, right out of the box. Everything on the card is architecturally identical to the existing Radeon X1800 XT (for more information on that board, check out the December 2005 issue of *CPU*, page 62). ATI's compositing engine is the only notable exception. The new engine leverages the power of two dual-link TMDS transmitters running at 165MHz, providing enough bandwidth to drive displays up to 2,560 x 1,600 at 60Hz. It effectively smashes any argument against the previous generation's limited output support.

And the performance is finally on par with Nvidia's fastest graphics processor. In tests against a GeForce 7800 GTX SLI configuration, ATI's new CrossFire solution managed to proffer better numbers in Far Cry and Quake 4, barely giving up Half-Life 2 and F.E.A.R at 1,600 x 1,200. A pair of 512MB 7800 GTX boards would certainly run faster, but they're pricier and in limited supply.



Radeon X1800 XT CrossFire Edition (512MB)
ATI
(905) 882-2600
www.ati.com

There's a good reason to want one of those 512MB boards, though. The extra memory capacity comes in handy when you crank up the eye-candy features. When you compare the performance of ATI's best visual settings (14X Super AA 16XAF) to Nvidia's top settings (16X SLI AA 16XAF), the disparity is massive. In most games it means the difference between playable performance and a slideshow. To be fair, Nvidia might be at a disadvantage with its 16X mode compared to ATI's 14X. So I also tested the GeForce 7800 GTX at 8XAA and continued to see ATI's highest quality combination put up better benchmark numbers.

ATI estimates that one Radeon X1800 XT CrossFire Edition master card will cost $599. A standard Radeon X1800 XT, used as a slave card, sells for about $10 less. In comparison, a pair of GeForce 7800 GTX 256MB boards sell for about $900. Nvidia's 512MB monsters sit at the other end of the spectrum, commanding an astounding $750 each. But even if you have money for the $1,500 pair, as of this writing, they weren't available.

Radeon X1800 XT furthers ATI's enthusiast interest, an area where the company has fallen behind during the past year or so. Adding CrossFire to the equation gives affluent gamers just one more choice when it comes to accelerating the newest software. Kudos to ATI for delivering the Radeon X1800 XT CrossFire Edition in a timely manner and improving its corresponding technology. ▲

by Chris Angelini

The Numbers

Standard Tests

	ATI Radeon X1800 XT CrossFire Edition	Nvidia GeForce 7800 GTX 256MB SLI
Half-Life 2		
1,024 x 768	100.01	100.9
1,600 x 1,200 (4XAA, 8XAF)	92.96	99.82
Far Cry		
1,024 x 768	102.94	106.41
1,600 x 1,200 (4XAA, 8XAF)	101.78	88.23
Quake 4		
1,024 x 768	103.9	111.4
1,600 x 1,200 (4XAA, 8XAF)	91.1	86.7
F.E.A.R.		
1,024 x 768	76	102
1,600 x 1,200 (4XAA, 8XAF)	44	50

Super High-Quality Tests

	ATI Radeon X1800 XT CrossFire Edition (14XAA, 16XAF)	Nvidia GeForce 7800 GTX 256MB SLI (16X/8XAA, 16XAF)
Half-Life 2 (1,600 x 1,200)	88.08	38.15/57.92
Far Cry (1,600 x 1,200)	60.62	23.37/39.45
Quake 4 (1,600 x 1,200)	54.5	19.9/40.1
F.E.A.R. (1,600 x 1,200)	13	6/12

Specs: ATI Radeon X1800 XT GPU (625MHz); 512MB GDDR3 memory (750MHz); PCI-E x16; max resolution 2,560 x 1,600 at up to 60Hz; dual-slot cooler design; auxiliary power required

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

PowerColor Theater 550 Pro PCI Express

We've been looking at PCI Express platforms for more than a year now. Slowly but surely, peripheral vendors are running into the limits of PCI with technologies such as SATA 3Gbps and FireWire 800, though. And now ATI's Theater 550 Pro is making the transition to PCI-E on a TV tuner board from PowerColor. Not that a tuner eats up enough bandwidth to require PCI-E, but moving the card will admittedly free up PCI throughput on a well-utilized media center machine for subsystems such as sound, USB, and storage.

More important than PowerColor's interface is the Theater 550's video processor. As you know, making full use of ATI's new Avivo display pipeline requires an X1000-series graphics card and the Theater 550 Pro processor, which handles capture and encoding. From a quality perspective, the chip adds automatic gain control, 12-bit ADCs, a 3D comb filter, and hardware noise reduction. Performance-wise, accelerated MPEG-2 encoding keeps host processor utilization low when you pause TV or record a show.

PowerColor
Theater 550 PRO
Watch the best Quality TV on Your PC
Video Capture & Real-Time Hardware MPEG2 Encoding
Listened to FM Radio

HDTV has really spoiled me on conventional over-the-air analog broadcasts. But playback quality on the Theater 550 Pro looks as good as can be expected. Then again, quality isn't in question with a high-end tuner such as this one. The Theater 550 Pro came out more than a year ago and proved its pedigree through a number of PCI add-in cards.

Instead, software, accessories, and ease of use help define the card's position. PowerColor opted to go with CyberLink's PowerCinema 4 instead of ATI's Multimedia Center suite. Frankly, the CyberLink app isn't as good, so it's fortunate that ATI is also boasting official MCE 2005 compliance because you'll either want to use that or SnapStream's Beyond TV instead. ▲

by Chris Angelini

Specs: ATI Theater 550 Pro video processor; 16MB DDR memory; 12-bit video engine; PCI-E x1 interface; cable/antenna and FM inputs; IR remote control; CyberLink software bundle

Theater 550 Pro PCI Express
$90
PowerColor
(626) 336-6845
www.powercolor.com

Cooler Master CM Stacker 830

Much of the CM Stacker 830's chassis is held together with retention clips. This can leave things feeling rickety, particularly the slide-out motherboard tray and not-quite-tight locking drive rails, but even with a pair of hard drives and a loud 48X CD burner installed, I didn't hear any vibration noise. CM uses four rubber grommets to isolate the 3.5-inch drive cage, but no other noise dampening considerations are present. The 830 is both ATX- and BTX-ready out of the box, yet with no screw hole form factor markings on the tray, installation takes a bit longer.

I like the 830's cosmetics. The plastic the company uses on the top panel is a bit cheap-looking, and the blue LEDs the top-facing power button and HD activity windows use are blinding, but overall the impression is one of class and power. Also, having non-stealthed, but not ugly, USB and FireWire ports on both the top and front faces was a smart touch.

The 830 boasts nine external 5.25-inch bays. Within that, four 3.5-inch bays are built into a cage that only consumes three of the 5.25-inch bays. The cage sports a 120mm intake fan. There's another 120mm exhaust fan in the case's top, on the back panel, and in the swinging fan frame, which Cooler Master notes on its site as optional. You can add another three 120mm fans on this frame, and the case allows for nine fans total—if you don't use any internal drives. The four that are included feature blue LEDs and are commendably quiet. There is a huge amount of vent area on this chassis; just be aware that the grilles not only provide a somewhat unattractive view of the motherboard tray's bottom but also will do little to keep out dust.

Overall, the 830 earns its keep. The aesthetic and functional updates over the first Stacker are incremental but clever and worthwhile. ▲

by William Van Winkle

CM Stacker 830
$259
Cooler Master
(909) 673-9880
www.coolermaster.com

Specs: 9 5.25-inch bays; ATX, E-ATX, BTX compatible; support for 9 fans; 4 120mm fans included; front/top ports: 1 1394a, mic, headphone, 4 USB

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Intel 65nm Presler Extreme Edition & 975X Platform

Specs: Presler (dual-core); 65nm; 2 2MB L2 cache; 1,066MHz FSB; Hyper-Threading technology; Virtualization Technology; EM64T technology; XD bit; 975X platform with flexible PCI-E I/O

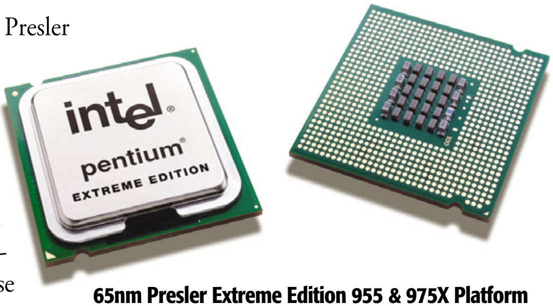
Many enthusiasts believe Intel has been running ever since AMD unveiled the Athlon 64, but that isn't entirely true. Yes, I'm aware AMD is claiming more market share each quarter, and yes, an Athlon 64 will get you better gaming performance. However, Intel still has a manufacturing advantage on its side. There is that, along with a revamped road map promising to do away with the stretched-out NetBurst execution pipeline. You probably won't see the fruits of those architectural changes until the end of 2006, though, leaving NetBurst to parry AMD's incessant dual-core uppercuts.

It's a good thing that Intel continues shrinking its lithography process, adding clock speed and cache to its existing best effort. Presler represents Intel's first 65nm core and although it continues leveraging an aged and tiring design, the drop to 65nm enables a greater number of functional dies per wafer. Dividing each core in two further improves yield. Whereas Smithfield (Pentium D) combines two cores on one physical die, Presler puts two dies on a single package.

In moving from a single-core Prescott with 2MB to Smithfield, enthusiasts were forced to give up one megabyte of cache per core. Presler changes that by leveraging two cores, each with 2MB of L2 for a total of 4MB. Intel also includes EM64T extensions and the Execute Disable Bit. Purportedly, the Pentium 4 950 (3.4GHz), 940 (3.2GHz), and 930 (3GHz) feature EIST; my sample Pentium Extreme Edition 955 didn't, however. The Extreme Edition chip does wield Hyper-Threading technology, a feature unique to the high-end EE that lets it operate on four threads concurrently.

One brand-new feature that all Presler chips share in common is Intel Virtualization Technology, ideal for power users looking to run multiple OSes without typical multiboot complications. Turning the technology on is simple; it's a basic BIOS switch. Taking advantage of it is pretty easy, too, because VMware's VMware Workstation 5.5 already supports the hardware. Running separate OSes lets you experiment with 64-bit technology, run an independent virtual machine with Linux, or play around with an x86 version of OS X, should it become available. All software is isolated, protecting the resources in each partition.

Intel is also rolling out another new platform called 975X. A majority of the features carry over from the 955X, including official DDR2-667 memory support, up to a 1,066MHz FSB, and a x16 PCI Express link. The accompanying ICH7-R hasn't changed a bit. It still does HD audio, SATA 3Gbps, and up to six x1 PCI-E connections. In fact, the only apparent difference between 975X and 955X is a configurable PCI-E arrangement. If a motherboard manufacturer so chooses, it can split the graphics connection into two x8 slots for dual-card operation. Take that with a grain of salt, though.



65nm Presler Extreme Edition 955 & 975X Platform
Intel
(408) 765-8080
www.intel.com

After all, wouldn't it be better to instead buy an nForce4 SLI board with dual x16 slots or ATI's RD580 when that emerges?

On paper, the Pentium Extreme Edition 955 should scream. It has a wider FSB keeping the two cores fed, more accessible memory bandwidth, a super-sized L2 cache, and more operating frequency. Indeed, the benchmark results indicate a significant improvement over Intel's Extreme Edition 840 and even the Athlon 64 X2 4800+. AMD maintains its gaming advantage, but once you jump to 1,600 x 1,200, the gap disappears. Truly, this 955 looks to be Intel's most compelling processor in recent memory. ▲

by Chris Angelini

Benchmark Digits

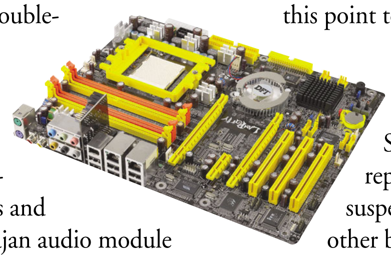
	Pentium Extreme Edition 955	Pentium Extreme Edition 840	Athlon 64 X2 4800+
Dr. DivX (minutes: seconds)	12:10	13:29	13:08
WinRAR (500MB Compression)	3:42	4:12	4:02
PCMark05	5903	5480	5712
F.E.A.R. (1,024 x 768)	87fps	85fps	93fps

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

DFI LANParty UT RDX200 CF-DR

LANParty UT RDX200 CF-DR
$220
DFI
(510) 247-8000
www.dfiweb.com
CPU CPU CPU CPU

DFI's RDX200 is the first retail CrossFire motherboard I've seen in North America, and it has tons to offer anyone who doubted ATI's ability to create a crushing chipset. DFI took everything ATI offered in the Radeon Xpress 200 reference design and ran with it. The BIOS is overflowing with overclocking and tweaking options. DFI went even further by implementing a true CAS 1.5 option for this AMD Athlon 64 platform, supporting 4.03V, and enabling a 1T setting for four double-sided DIMMs.



Habitually excellent LANParty features abound: 100% Japanese capacitors, UV-sensitive slots and rounded cables, a Karajan audio module with Azalia HD audio (Realtek ALC882), a mag-lev fan on the northbridge, onboard power and reset buttons, coax SPDIF in/out, and more. However, only one of the two Marvell Gigabit Ethernet ports is PCI-E-based. Neither the Silicon Image 3114 RAID chip nor ATI's own SB450 southbridge offer 3Gbps SATA support. Given that 3Gbps is now practically a checkbox item (even if internal transfer rates on desktop drives fall far short of 3Gbps), it's odd that ATI and DFI ceded this point to competitors.

Also, my sample board failed to register any SATA ports from the SB450. Others haven't reported this problem, so I suspect it's an isolated case. The other bit of oddness is that ATI's downloadable 5.12 Catalyst drivers (current as of this writing) wouldn't install without basic errors. Backing out to the 5.10 version that shipped with my X850 XT CrossFire card solved the problem.

Fortunately, the RDX200 is lightning fast. Moving from a single X850 XT into dual CrossFire X850 XTs (backed by an Athlon FX-55 and 2GB of Corsair 3500LLPRO), 3DMark05 scores jumped from 6125 to 10647. Doom 3 spiked from 67.4fps to 100.2fps at 1,280 x 1,024 Ultra settings. In app after app, DFI's performance was impressive. Now, if the next RDX200 would pick a stronger southbridge and a beefy BIOS update, I'd be hard pressed to pick a better board. ▲

Specs: Socket: 939; Chipset: ATI Radeon Xpress 200 CrossFire + ATI SB450; Max memory: 4GB; Audio: Realtek ALC882 7.1; LAN: Marvell 88E8053 (PCI-E) + 88E8001 (PCI) dual GbE; Slots: 2 x16 PCI-E, 1 x1 PCI-E, 3 PCI

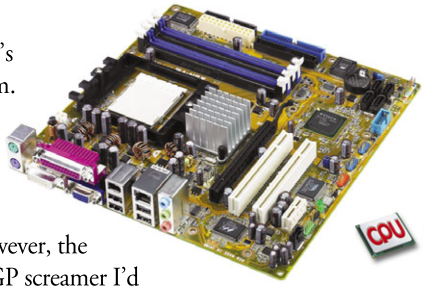
by William Van Winkle

Asus A8N-VM CSM

A8N-VM CSM
$88
Asus
(510) 739-3777
www.asus.com
CPU CPU CPU CPU

As Intel's Viiv push ratchets into high gear, there is renewed emphasis on HTPCs and packing as much functionality as possible into the smallest possible size. Those willing to look beyond Viiv and the Pentium M to fulfill this vision would be hard pressed to find a better motherboard than Asus' A8N-VM CSM, a micro ATX titan bearing the pinnacle of Nvidia's new GeForce IGP chipset lineup, the GeForce 6150 and nForce 430.

The board has one VGA and one DVI port for integrated graphics. The 6150 chip gives you an extra 50MHz of graphics clock speed over the 6100 plus HD (1080p/i) support, TV encoding, and high quality (5 x 4) video scaling. Similarly, the nForce 430 has four 3Gbps SATA ports, RAID 5, Gigabit Ethernet, and ActiveArmor Firewall. The IGP chipset supports Nvidia's PureVideo HD platform.



I tested with the 0506 BIOS, which remedies some of the shortcomings with the 0303 launch BIOS. However, the 6150 wasn't quite the IGP screamer I'd hoped. For example, in prior tests of ATI's RS480 K8 chipset, I saw 3DMark05 game scores clustered around 640 and Doom 3 (1,024 x 768, high) scores around 8.7. Here, I pulled in 722 and 9.1, respectively, decent and competitive but not stunning considering that I jumped from a 4000+ in previous tests to an FX-55 here. Running the same config as DFI's CrossFire board (see the review below), the A8N-VM CSM ran slightly faster in all tests, including a 150 point jump in 3DMark05.

Still, that's not the point. What matters in this type of board is that it runs apps such as Half-Life 2 and Dr. DivX without glitches, and I never had a problem following Windows installation. Asus chooses to add 1394a and a 5.1 HD Audio implementation with jack sensing but doesn't spend much time building tweak options into the BIOS. The only feature that should have been integrated onto the board and wasn't was SPDIF. But with an $88 list price at launch, there's no room to complain. This is a stellar board for home media. ▲

Specs: Socket: 939; Chipset: GeForce 6150 + nForce 430; RAM: 4 184-pin DIMM; Slots: 1 PCI-E x16, 1 PCIe x1, 2 PCI; HDD Ports: 4 SATA, 1 PATA; LAN: Marvell 88E1111 GbE; Audio: ADI AD1986A 5.1 HD Audio

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Anand's Corner

Introducing Intel's Core Duo Processor

by Anand Lal Shimpi

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today*, CBS' 48 Hours, and Fortune. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

I'm still getting used to the new name, but it looks like "Core Duo" is what I'll have to start calling Yonah from now on. But because I'm writing this before Intel's official launch, I'm just going to call it Yonah. Naming aside (and I'll save you from going through Yonah's new processor numbers), the chip itself is a pretty important advancement in mobile computing.

For starters, Yonah finally brings multiple processors to the notebook space. In the ongoing quest to narrow the gap between mobile and desktop performance, the multitasking advantages offered by a dual-core platform are much needed on notebooks today. There's nothing that brings a notebook to its knees quite like any sort of medium to heavy multitasking loads.

Almost as important as the fact that Yonah is a dual-core CPU is the fact that each one of its cores is improved from the previous 90nm Dothan Pentium M. Intel has listed the enhancements of the new core as follows:

- SSE decoder throughput improvement, yielding better SSE performance
- SSE and SSE2 operations can now be fused using Yonah's Micro Ops Fusion engine, resulting in higher IPC (instructions per clock) when dealing with SSE/SSE2 code
- SSE3 support
- Additional FP performance enhancements

Pretty much all of Yonah's enhancements revolve around floating-point performance, which makes sense given its predecessor's already strong integer performance and its stiff competition from AMD in floating-point performance.

Not everything is peachy with Yonah, however, as Intel has increased its cache latency by an incredible 40%; so in single-threaded applications, Yonah may actually be slightly outperformed by a similarly clocked Dothan. But toss in some multithreaded applications or start multitasking with Yonah, and the higher latency cache is almost entirely forgotten. Despite the slower cache accesses, the overall performance of Yonah is quite impressive. At 2GHz, it basically falls between the performance of an Athlon 64 X2 3800+ and an X2 4200+—in a notebook, and while consuming less power than both.

No, Yonah's higher latency L2 cache isn't what saddens me about the chip; instead, it's the clock speeds. While Yonah debuts at very similar clock speeds to its predecessor, it's only set to receive a single speed bump, up to 2.33GHz. That's probably more than enough on the notebook side, but on the desktop it's not going to be able to compete with AMD's very high-end Athlon 64 X2s (although it should do fine in the midrange).

The move to dual-core and the FP-centric upgrades mean that Yonah is far more competitive in media encoding than Dothan ever was. However, because most games continue to be single-threaded only, Yonah tends to offer little or a negative performance impact over Dothan in many games, which unfortunately means that it isn't the gaming chip we were hoping for.

Why do I care about Yonah as a gaming chip? Well, more than anything else out currently, Yonah gives us a good indication of the performance of Intel's Conroe, Merom, and Woodcrest cores, which will dominate Intel's product lines at the end of 2006. And those cores will be what Intel has to use to compete with the best of the best from AMD on the desktop.

So what does this tell us about Conroe and Merom? Well, for starters, they will bring about a longer pipeline to help boost clock speed. A longer pipeline also means higher power consumption, but thankfully we're not talking anywhere near the power consumption of Intel's Pentium 4. Although a longer pipeline brings about a higher clock speed, it also reduces the efficiency of the core, but Intel has another trick to help balance that out: Conroe and Merom are 4-issue cores (vs. 3-issue for each of Yonah's cores). By increasing issue width you can expect the efficiency of these cores, overall, to go up in comparison to Yonah. The increased issue width and some cache and prefetching improvements will be what Conroe and Merom will have to rely on to close the gap between AMD and Intel's gaming performance at the end of next year. ▲

> There's nothing that brings a notebook to its knees quite like any sort of medium to heavy multitasking loads.

Talk back to Anand@cpumag.com.

The Shark Tank

Xbox 360

by Alex “Sharky” Ross

By now some of you lucky readers will have no doubt spent countless hours in front of an HDTV playing that swanky new Xbox 360, instead of the PC. Hopefully none of you were involved in scuffles, muggings, or any of the other shenanigans that took place thanks to the rather sleazy “shortage” of units during the launch. Last month I was sure that there was more than enough first-person-shooter goodness on the PC to keep my one-track mind away from any Xbox 360 madness. The trouble is that I finished Quake 4 sooner than I had hoped (some great twists in there), Call Of Duty 2 was over before it really got started, and F.E.A.R got tiresome. In reality I couldn’t help but look over my shoulder as the Xbox 360 launch got closer and closer. The darn thing is pretty much a PC anyway. That’s my excuse for getting one anyway.

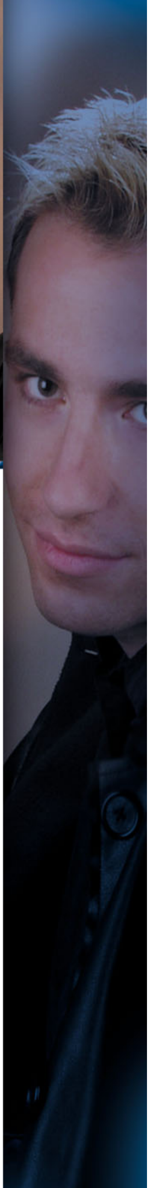
The first thing you notice is that Microsoft has tried to blend the console in more with your existing living room entertainment center. The hourglass design is a little Apple-esque, and the annoying external power brick aside, it’s much more of a looker than the first Xbox. Inside the box is some very meaty hardware indeed—at least for a console. The multithreaded-friendly CPU consists of three IBM PowerPC cores running at 3.2GHz with 1MB of L2 cache. The graphics chip that ATI has put together is different than what’s been on the PC before and somewhat still under wraps. What we do know is it’s a 500MHz core with 10MB of embedded DRAM and shares some technology with the current Radeon X1800 XT; however, ATI claims it has several times the processing power of anything it’s achieved on the PC. The Xenos chip (as it is called) dives deep in and beyond even DirectX 10 and uses a unified shader architecture, which negates the need for separate pixel and vertex shaders. Interesting, indeed, and better still is the support for 4X FSAA and high-definition resolutions including 480p, 720p, and 1080i.

Microsoft’s second effort in the console world is obviously far superior to its first. With Xbox Live Games and Xbox Live Marketplace (what an awesome idea that is), Microsoft is sure to build up a loyal community. The USB 2.0 ports are a nice touch, and they actually work, too. (I plugged in an iPod.) The new controllers are not only ergonomically pleasing, but they are wireless, as well. Excellent. The removable 20GB “optional” hard drive is useful but should be standard. The backward compatibility with the original Xbox is also a smart move.

The only downside is the current lack of a Halo-esque app. There are plenty of games on the horizon (Huxley, Halo 3, and Gears Of War to name a few), but the fact is they are not here yet. In the meantime the real looker of the bunch has to be Project Gotham Racing 3. The level of detail is phenomenal, and the presentation second to no other racing game. It might not keep you addicted in the same fashion as a GT game on the PS2, but visually it’s far superior. Call Of Duty 2 and Quake 4 look great, but then again we are used to this level and then some already on the PC. For console-only folks, however, these two games will be a big step up in terms of graphics.

The PC isn’t dead; far from it. As usual when a new console comes out, we all get a bit flustered, carried away, and pay way too much initially. After the dust settles and more content arrives, I do feel we will still be talking about the Xbox 360, and it will be more than just a flash in the pan. After a couple of weeks on it, however, I’m going back to the trusty PC, thanks. ▲

Email me at sharky@cpumag.com



Disrupting Reuters’ newswire with a cheery Christmas greeting at age six, Alex “Sharky” Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overclocks/tunes Porsche 996 Turbos with www.sharkwerks.com when he’s not tweaking PCs.

In reality I couldn’t help but look over my shoulder as the Xbox 360 launch got closer and closer.

Protecting Your Jewels

by Kyle Bennett

I wax poetic about all sorts of stuff here each month, or at least I like to think I do. OK, you know the only thing I wax is my truck—maybe twice a year. What I do tend to focus on, though, is how computer performance impacts your computing experience. This month, I'm going to discuss RAID storage technologies, or lack thereof, and how that may be changing your computing experience.

Everyone here knows you should back up your data on a regular basis, especially if you use your computer for anything work-related. But the fact is surveys from companies such as Iomega have shown that more than 40% of computer users never back up their data. Up to 70% of users at home never back up data, or if they do they don't do it very frequently. So, we all know we're supposed to do this, but we just don't. A decade ago, you could argue that backing up wasn't that big of a thing because there wasn't much to lose. Heck, just a few floppies later and you had a brand new OS up and running.

Today's home computing scenario has matured greatly. To be succinct, many of us have data on our home PCs that's irreplaceable should it end up corrupt. Just think of all the email we have that covers all sorts of purposes, including order confirmations, proof of who has committed to what, and countless other tidbits of information many of us find we need to save. Beyond that, you might have sensitive legal and financial documents. What about all those family pictures and videos you now have in digital formats? Certainly you would hate to lose those. And last but not least, I know more than a few of you have huge music and movie collections that have been moved to bits and bytes. And still we don't back it up.

RAID, or Redundant Array of Independent Disks, has been all the buzz for a couple of years now. You can't look at a motherboard box without seeing "RAID" emblazoned across the front as a key integrated component. Many folks that build their own computers do use different forms of RAID to back up their data on the fly. RAID-1 basically mirrors two or more hard drives, so that if one hard drive fails, you still have a full duplicate. This is likely the most simple form of RAID, but it requires two hard drives, one of which you don't actually get to "use." Thus, many folks see this as expensive.

RAID-5 has been becoming a more common term for the desktop this year; we have seen it supported by Silicon Image's 3114 controller chip mainly, with Highpoint and Nvidia offering support, as well. In Nvidia's case, its RAID is integrated into its motherboard chipset solution, whereas the other two mentioned are add-on controllers that can be seen as integrated components or stand-alone add-in cards.

For those of you curious about RAID-5, it has been a backbone array in the server and workstation business for years. You need at least three hard drives, and these three hard drives work together in that they give you redundancy and performance increases. If you are to lose a drive in a three-drive RAID-5 array, you don't lose any data. You will, however, lose the performance until the lost drive is replaced.

Now the great thing is that we are starting to see the above companies mention RAID-5 support, and of course, you think you might be able to use it on the desktop. But the sad fact is that most of the solutions that are available for the desktop today are so slow that they are painful to use on your PC. RAID-5 requires a lot of horsepower to write to disk, and the current desktop solutions that we are seeing just do not have the power to accomplish writes quickly.

So, while I have rambled on a bit here, my point is that you need to back up your data, and RAID is a good way to do that. When we finally have a real RAID-5 solution for the desktop that is coupled with falling-per-GB hard drive prices, RAID-5 is going to be a big deal for all of us and it will keep our data safe—all the time. Until then, get yourself a solid RAID-1 solution in place and back up on-the-fly without any hassles. ▲

Kyle Bennett is editor-in-chief of HardOCP.com one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

You can't look at a motherboard box without seeing "RAID" emblazoned across the front as a key integrated component.

You can talk with Kyle at kyle@cpumag.com.

PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

Mods & Ends

Koolance Liquid RAM Cooler

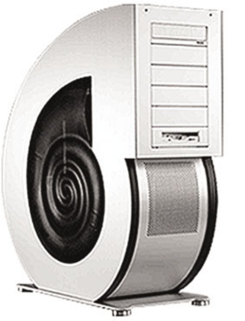
Liquid-cooling fans have a new weapon in the battle against heat in the form of the Koolance Liquid RAM Cooler (RAM-30-V06). One Liquid RAM Cooler ($50) can cool both sides of up to two adjacent memory sticks, and two Liquid RAM Coolers can concurrently cool up to four DIMMs.

The Liquid RAM Cooler (6 ounces in weight) uses Koolance's patent-pending Hydra-Pak soft cooler technology, which extracts heat in a manner that more common rigid coolers can't. You can adjust the Liquid RAM Cooler's width for the appropriate contact pressure, and the cooler has a thumb screw for easy installation. Koolance claims the cooler will work properly with DDR2, DDR, and older SD DIMMs. Because the apparatus mounts to the tabs that lock the memory in place on a motherboard, however, there must be adequate clearance around the DIMM slots to use the cooler.

Liquid cooling isn't just for processors and video cards anymore, as Koolance's Liquid RAM Cooler proves.

Lian Li PC-777

To commemorate its 20th anniversary, Lian Li has released the unusually shaped PC-777 ($330). The case is available in aluminum and black trims and has a unique, somewhat circular design that's meant to optimize air circulation and minimize noise. There's two 120mm fans, including one for air intake and the other for exhaust. There are also six external 5.25-inch drive bays, six internal 3.5-inch drive bays, and matching floppy and optical drive bezels.



Lian Li designed the uniquely shaped PC-777 enclosure to commemorate the company's 20th anniversary.

To go along with its unique snail-like shape, the Lian-Li PC-777 incorporates a few other less-common features, such as top-mounted power and reset switches. The top location of the buttons, situated right along the front bezel, allows for easier access. In addition, next to the switches is a group of I/O connectors, including two USB 2.0 ports, one FireWire port, and microphone and earphone jacks.

Thermaltake Blue Orb II CPU Cooler

Longtime overclockers are no doubt familiar with Thermaltake's original Golden Orb CPU cooler, or Gorb as it was affectionately known. The Golden Orb was an extremely popular processor cooler from way back in the days when overclockers sought after Celerons, and AMD's Athlon was the new kid on the block. Thermaltake has now introduced a revision of the Golden Orb, dubbed the Golden Orb II ($40), for LGA775 Intel processors and all Athlon 64/X2/Sempron processors.

Thermaltake also recently unveiled the Blue Orb II ($40), which comes complete with a copper core and a nearly silent, lighted fan. The Blue Orb II's 120mm fan generates noise levels of only 17db, but thanks to its 140 oversized aluminum heatsink fins, the Blue Orb II outperforms most stock CPU coolers and rivals the performance of even the most capable aftermarket aircoolers. If you have a windowed case, the Blue Orb II will be right at home. It should also satisfy any enthusiast looking for a quiet, high-performance aircooler.

Fashionably Fresh Firmware

Power Mac G5 1.8GHz (600MHz bus)

This System Firmware Update for the 1.8GHz, single-processor Power Mac G5 improves the rig's reliability, particularly if it has been inactive for two hours or more.

www.apple.com

Plextor PX-750A DVD Recorder (v1.01)

Plextor has released an update for its PX-750A DVD±R drive that improves the write quality for various types of media.

www.plextor.com

Konica Minolta Dimage A1 & A2 Updates (v1.1.3 and v1.1.4)

Recent updates for the Dimage A1 and A2 increase writing speeds to memory cards and also enhance USB transfer speeds. In addition, the updates speed up data transfers to and from the memory card.

www.konicaminolta.com

by Marco Chiappetta

Dive Into Liquid

Cool Your PC With H_2O

Cooling a PC with water or liquid was once considered exotic and perhaps even a little irrational. After all, we've been told for years that water and electronics don't mix. Many users thought liquid cooling simply wasn't necessary except for the most extreme circumstances, and putting together a liquid-cooled system was usually fairly difficult. Finding all the required parts sometimes meant hitting up the local aquarium specialists, hardware store, and even auto parts dealer—hardly the places you'd expect to purchase parts for a PC.

Times have certainly changed, though. There is now a multitude of high-quality, highly reliable preconfigured liquid-cooling kits available from numerous reputable companies. (See our roundup of easy-to-install watercooling kits in last month's *CPU*, page 18.) Shoot, even Apple has begun using a watercooling system on some of its top-of-the-line dual-processor G5 Macs.

Overall, liquid cooling a PC has a few advantages over aircooling, including lower noise levels and often higher performance.

Zalman's Reserator 1 Plus kit includes a pump, reservoir, tubing, and CPU and GPU waterblocks—everything necessary to assemble a good liquid-cooling system.

There are some caveats to liquid cooling, however, including the cost and the potential for leaks that could lead to catastrophic failures. With some time and patience, though, you'll be a liquid-cooling expert in no time. We spent some quality time building and installing a complete liquid-cooling kit from Zalman that's capable of cooling a CPU and a GPU. Follow the guidelines outlined here, and you'll minimize the chance of failure and end up with an immaculate liquid-cooled rig that'll make your friends green with envy.

The Ingredients

Before we detail the process of installing our liquid-cooling kit, it's worth summarizing the components a typical system will include and use. Parts you'll normally find in a liquid-cooling kit include:

- **reservoir**—used to hold coolant and bleed the system, which means removing any air bubbles from the hose loop
- **pump**—used to force liquid coolant through the system
- **tubing**—used to link the various components together and carry the coolant
- **radiator**—used to dissipate and disperse heat from the coolant circulating throughout the system; radiators can be actively or passively cooled, depending on the specific application
- **fans**—used to actively cool the liquid circulating through the radiator by moving air over the radiator fins
- **flow indicators**—used as a method to quickly check that the coolant is properly circulating through the system
- **waterblocks**—used to transfer heat from various system components to the coolant

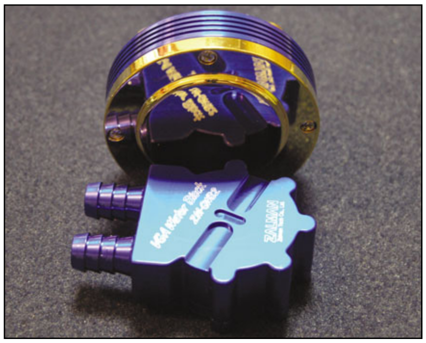
You can purchase the parts necessary to construct a watercooling system separately and piece together a custom kit of your own or buy an all-inclusive package to facilitate the process. We opted for the latter route because our goal was to silently liquid-cool our system, and Zalman's Reserator 1 Plus ($229) fit our needs perfectly. The Reserator 1 Plus is a fanless liquid-cooling kit that includes a silent water pump, tubing, CPU and GPU waterblocks, and all the miscellaneous parts necessary to install the kit.

Measure Twice, Cut Once

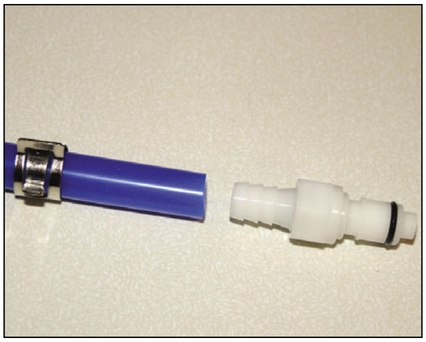
The first step to installing a liquid-cooling kit is ensuring that you have all the necessary parts. Few things are more frustrating than realizing you're missing parts when you're in the middle of a build. We discovered this the hard way; when we started to mount our CPU waterblock, we found that the proprietary mounting hardware in our kit wasn't complete. We're a resourceful bunch, though, and we made due with our motherboard's stock CPU cooler retention bracket and a couple of well-placed screws.

When you're certain that you have all the necessary parts, the next step is to lay

The flow indicator is connected in-line with the tubing to make it easy to check that the liquid coolant is properly circulating through the system.



The bases of the CPU and GPU waterblocks included in our liquid-cooling kit were polished to a mirror finish.



To install the plastic fittings, insert them first fully into the tubing and then hold them in place with the metal spring clamps.

Consider an anticorrosion coolant additive a must-have for long-term reliability and performance of your kit.

them out and plan how you'll route the tubing throughout the system. In a typical system, you'll construct a single loop of parts. For example, the waterpump will force liquid from the reservoir through the tubing into the waterblocks and then through the radiator where the coolant's temperature is reduced. The coolant will then move back to the reservoir, where the process begins again.

Once you've planned how you'll route the tubing through the system, you can begin cutting the tubes to size and assembling the kit. When cutting the tubes, remember the old mantra, "measure twice, cut once." This will make the process much easier and could save you some money should you need to replace some tubing because you cut it too short the first time. To cut the tubing, use a sharp knife or razor blade and slice at a 90-degree angle. Don't cut the tubing at an angle, or it will not seat properly on the fitting's barbs. In addition, it's best to have a bit of slack in the tubing so that it's easy to bend, and so it won't kink at sharp angles.

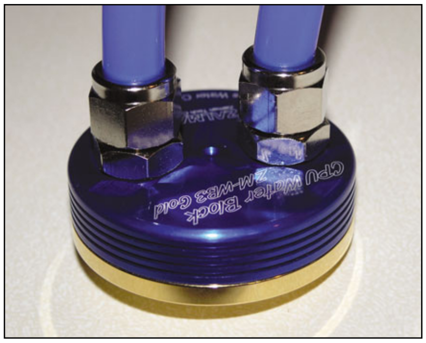
With the tubing cut to size, you can install it onto the appropriate fittings. First, slide the required clamps (or bolts if you're using a compression fitting) over the tubing and push the tubing over the barbs on the fittings. Next, secure the clamps in place (or tighten the bolts in the compression fittings as necessary). Be careful to not over-tighten any clamps, as this could lead to unwanted leaks. Firm hand-tightening is all that's necessary.

Initial Assembly

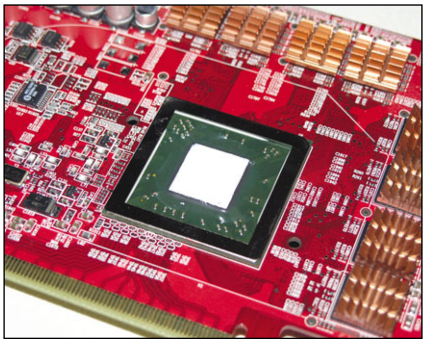
Once all the tubing is secure, the most difficult part of the assembly is over. With our kit we had to make three cuts to the tubing: one for the flow indicator, another for the CPU waterblock, and one for the GPU waterblock. Our kit used both spring clamps and compression fittings to hold the tubing in place.

The first part of the assembly process consisted of installing two plastic fittings with spring clamps at each end of the loop, which is where the tubing gets inserted into the Reserator's combination reservoir/pump/radiator. Next, we used compression fittings to secure the tubing to the flow indicator and CPU waterblock. We then secured tubing to the GPU waterblock with spring clips.

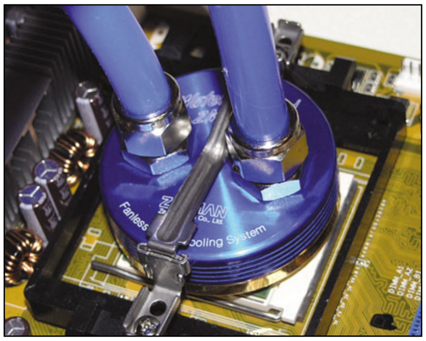
At this point you can mount the waterblocks and secure them in place. Our kit required using custom mounting hardware for the CPU and GPU waterblocks. When installing the waterblocks, you need to consider a few things. First, just like in a typical aircooled setup, you should apply an adequate layer of thermal paste to each component where you will install a waterblock. Second, when replacing a stock GPU cooler with a waterblock, you may have to add heatsinks to



Compression fittings hold the tubing in place on the CPU waterblock. The tubes are installed over the fittings on the waterblock, and nuts are then threaded to firmly lock the tubes in place.



Watercooling our system using the parts our kit bundled required first removing the stock cooler that came installed on our video card and replacing it with our waterblock.



After removing the stock cooler from our video card and applying a fresh coat of thermal paste to the GPU, we mounted the GPU waterblock and screwed it in place.

The feed and return tubes enter and exit the system through a perforated slot cover plate, which was included in our Zalman kit.

the video card's RAM. Some stock heatsink/fan assemblies also cool the card's RAM. If you replace these coolers with a GPU waterblock that doesn't also make contact with the card's RAM, the video card's RAM may overheat. Installing heatsinks on the video card's RAM chips will keep the RAM running reliably. Last, make sure the waterblocks are seated properly and making proper contact with the components they are meant to cool.

Liquid Cooling Dos & Don'ts

Installing and maintaining a liquid-cooling kit isn't terribly difficult. There are some special needs you should consider, however, to avoid potential problems. A liquid-cooled rig requires that certain components operate reliably, which isn't always the case with a more traditional aircooled system. The following are a few Dos and Don'ts where liquid-cooling is concerned.

- *Do* incorporate an anticorrosion additive into the system. This will increase the time between cleanings and help maintain optimal performance in the long run.
- *Do* follow the instructions included with the kit. To ensure the reliability of the system and keep your warranty intact, follow the manufacturer's installation recommendations.
- *Do* a leak-test prior to fully installing the system and applying power to your components. Finding a leak early could prevent a catastrophic failure later.
- *Do* check the tubing, fittings, and flow indicator frequently. Cracked or clogged tubing or diminished circulation could cause instability or total the system if there's a leak.
- *Don't* remove all the fans from your system after installing a liquid-cooling kit. Other components in the system, such as expansion cards and RAM, still need cooled, as well.
- *Don't* cut the tubing too short. You shouldn't have to stretch, kink, or bend the tubing sharply to make the connections between the waterblocks and reservoir.
- *Don't* use tap water. Even the cleanest water from a tap contains numerous contaminants that will quickly grow algae and corrode the waterblocks.
- *Don't* power up a system without first turning on the waterpump. Liquid should be circulating through the waterblocks before you power up the rest of the system.

Fill The Reservoir & Leak-Test

Once you have assembled the entire watercooling system, you're ready to fill it with coolant and test it for leaks. Consider a leak-test absolutely necessary, even when you are using a new kit. Improperly installed tubing, cracks, or other defects in any of the parts in the loop can cause leaks and potentially damage your components. Do yourself a favor and check for leaks *before* powering up the system.

Filling the liquid-cooling system with coolant is as easy as pouring distilled water and an anticorrosion additive into the reservoir and turning on the waterpump. The correct amount of liquid will vary from kit to kit. Our Zalman kit required about a half gallon of water and a few ounces of the included anticorrosion additive. It's important to use an anticorrosion additive to prevent oxidation and algae from building up. When two different metals are present in the same body of water, oxidation will occur much more rapidly than normal. In addition, algae will grow quickly in a closed loop of water. Not only will an anticorrosion additive prevent these things from happening, it will prolong the useable life of the kit.

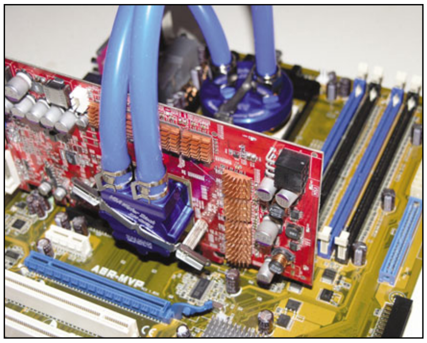
Once we poured the liquid into the reservoir, we turned on the waterpump and bled the system. To bleed the system, we just left the cap off of the reservoir and lightly flicked all of the tubing to dislodge any air bubbles. When bubbles stopped rising in the reservoir, we topped off the system with more distilled water and sealed the system up.

Next, we ran the kit for a few hours without applying any power to the rest of our components to check for leaks. It's helpful to wrap each fitting with a bit of paper towel to help spot leaks and to prevent liquid from making contact with any components. Only when you're absolutely certain that the liquid-cooling loop is free from leaks should you power up the rest of the system.

Final Assembly

With our Zalman Reserator 1 Plus liquid-cooling system complete and installed onto our components, we were ready for action. This Zalman kit was virtually silent, leak-free, and did an excellent job of keeping the CPU and GPU cool in our test system. It was so silent, in fact, we had to look at the flow indicator to see if the system was actually powered up. We consider this another successful mod completed.

by Marco Chiappetta



With the liquid-cooling kit completely assembled, we pumped coolant out of the reservoir, which fed it into the CPU waterblock. The coolant then flows into the GPU waterblock and ultimately back to the reservoir where it's cooled and sent back through the system.

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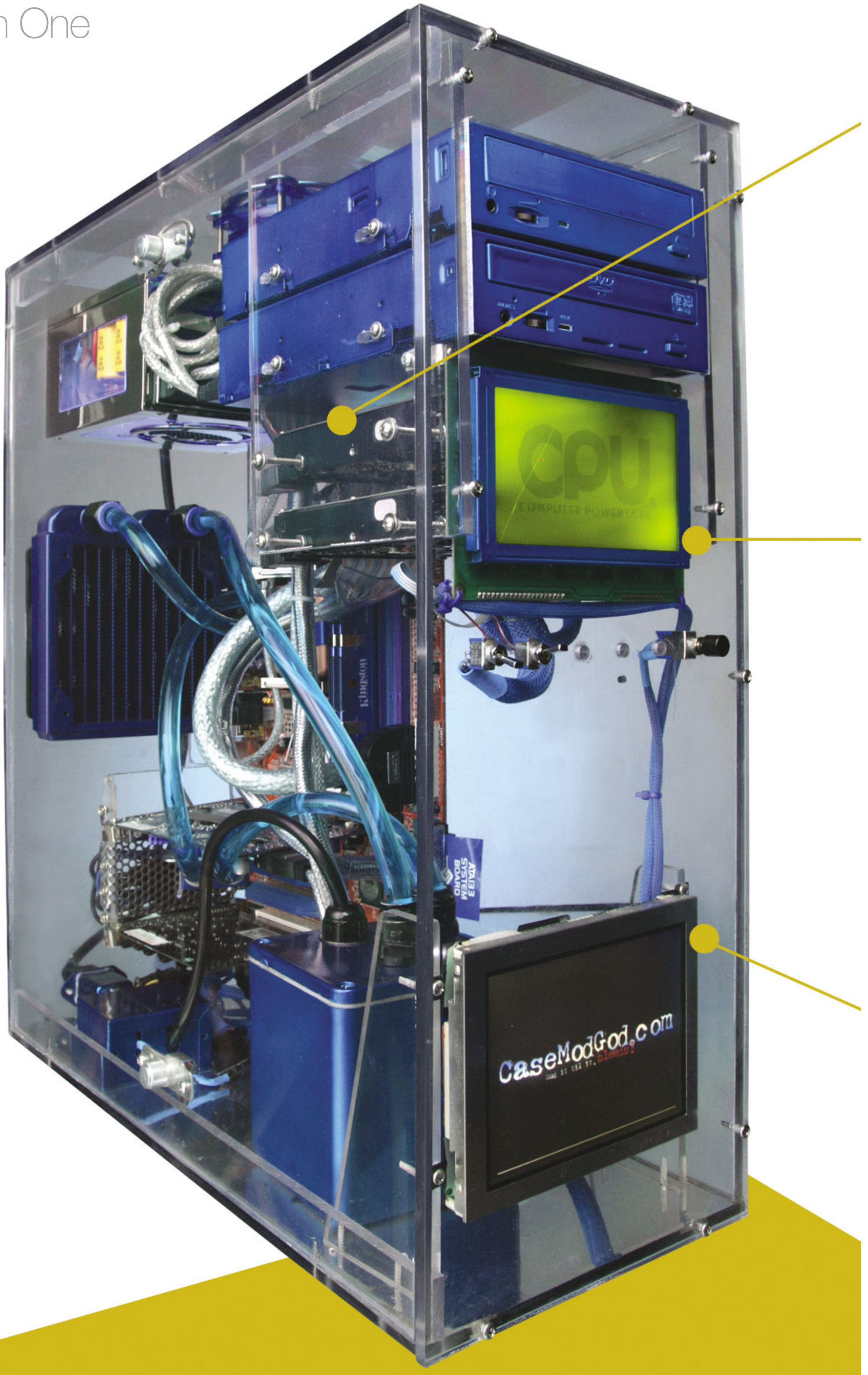
Mad Reader MOD

Two LCDs Are Better Than One



Many modders draw heavily from their artistic sides when they envision and create mods, so it's no surprise that modders, like other artists, see the world a little differently than others. Modders discover the modding possibilities in common items that other people use everyday. Without a doubt, Dewayne "AmericanFreak" Carel, co-owner and senior reviewer of the modding Web site CaseModGod.com, has a modder's eye. As a laundry and kitchen engineer at a luxury resort in Arizona, Carel saw Lexan's toughness up close.

"In the hotel business I knew of some stuff that we would put onto the faces of doors in the back-of-house areas to help from damaging the doors; it was Lexan," Carel says. "If the Lexan could withstand a 200- to 300-pound cart smashing against it, I knew it could handle anything I could throw at it."

Carel spent the next two weeks carefully designing a clear, uncluttered case, paying special attention to cable management. "The cutting and assembly of the case only took about another week or so," Carel says. Thus was born Lucid Dream. Carel also won a competition to build the best testing PSU for the Web site against CaseModGod.com's co-owner. Carel modeled his Mini Dream PSU after his flashy, yet shock-resistant, Lucid Dream and added test leads that let him quickly test various voltages. As with the case, the Mini Dream has a Lexan shell.

Although Carel uses Lucid Dream regularly and doesn't have any mods planned to change its personality, he feels it isn't quite done yet. For one thing, he wants to polish the hard drives. "I think any good modder knows that you are never finished and that you mod it 'Til It Bleeds," says Carel. ▲

by Joshua Gulick

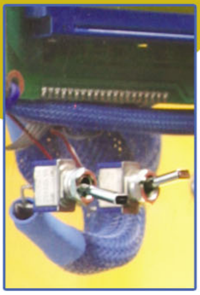
The naked hard drives are the only components that disrupt the color scheme. "I would really like to get them polished to a chrome-looking effect," Carel says. "It looks like I will have a lot of sanding and hand polishing to do."

Carel uses the top LCD to display Winamp information and email. He says he converted the *CPU* logo to a bitmap format so he could display it on the screen.

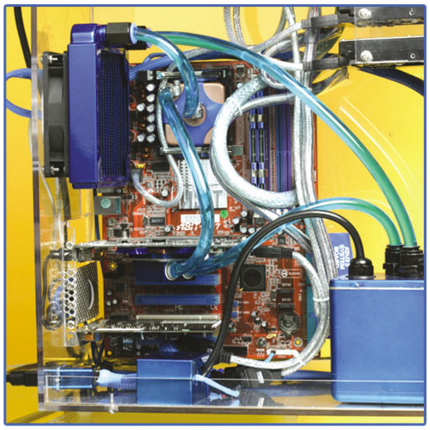
"The lower LCD is typically used in automobiles to display DVDs and such," Carel says. Carel made a custom cable, complete with an S-Video adapter that lets him easily reconnect the LCD whenever he swaps out the video card.

Carel relied on Swiftech watercooling components for the Lucid Dream system. This radiator is a Swiftech MCR120 120mm radiator.

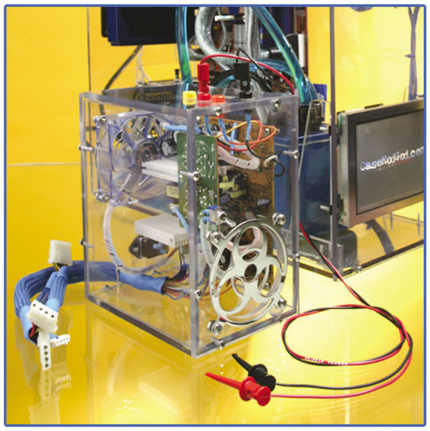
Carel chose watercooling over dusty fans for Lucid Dream. He selected 1/2-inch tubing. They use it for their Reserator 1 Plus watercooling systems, and it fit the color scheme," Carel says.



Power and reset switches control the upper LCD. "Sometimes the signal to the LCD will get a little messed up, so without having to reboot the system I can reset the LCD," Carel says.



A clear case demands a well-planned color scheme, so Carel painted the components. He started with a silver base coat and then layered on Dupli-Color Metalcast until the components appeared shiny.



Not surprisingly, the Mini Dream test PSU also boasts an ultra-tough Lexan case. "The test leads that plug into the top of the PSU have small hooks that appear when the tops are pushed," Carel says. "I clamp one wire in the voltage I want and clamp the other one into the ground and away we go."

These days, component specialists make some items that are so slick they resemble custom mods. This 500W Ultra X-Connect modular PSU is right at home in the Lucid Dream.

Give Us Your Mod

★ Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you a $1,500 Newegg.com gift certificate and a one-year subscription to *CPU*.

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Each month we dig deep into the mailbag here at CPU *in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*'s "Advanced Q&A Corner" is here for you.*

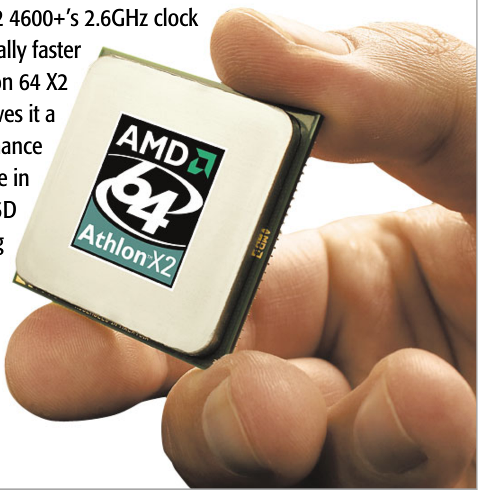
Louis D asked: I'm going to be building a workstation in a few months. I'm buying an Asus A8N SLI mobo, 4GB of OCZ's PC-3200 Performance Dual Channel RAM, and a PNY Quadro FX 1400 graphics card, with appropriate case, power supply, and drives. I'll use this machine mainly for 3D graphics (Maya and trueSpace) with some audio and video editing. I don't plan to overclock.

My question is: Will I be happier with an AMD Athlon 64 X2 4400+ or with the X2 4600+ with the smaller cache but slightly higher clock speed?

A: This is somewhat of a tough question, Louis, because of the conflicting philosophies we have running around inside our geek heads. On the one hand, looking at your system configuration and application usage model, we'd say go with the more expensive 4600+. On the other hand, we'd say the 4400+ has better bang for the buck.

However, we'll take your statements here for face value, with respect to overclocking and your intent to utilize the system as a "workstation," because for us this is a virtual jump-ball decision. Here's why: We scanned online outlets for pricing on the AMD Athlon 64 X2 4400+, as well as the Athlon 64 X2 4600+, and in round numbers, currently the 4600+ is selling for about $100 more than the 4400+. Furthermore, as you stated, there's a trade-off of

> "You probably wouldn't perceive the performance benefits of a RAID 0 array unless you're constantly moving or copying very large files."



The Athlon 64 X2 4600+'s 2.6GHz clock speed is marginally faster than the Athlon 64 X2 4400+, which gives it a 3% to 5% performance advantage in professional 3D rendering applications.

sorts with this chip. AMD certainly branded the 4600+ appropriately because almost across the board, in virtually all applications, it's anywhere from 3% to 10% faster than the 4400+. This is due to the chip's higher clock speed of 2.6GHz vs. the 2.4GHz clock speed of the Athlon 64 X2 4400+. More specifically, in professional 3D rendering applications that we've tested, such as Maya and 3D Studio Max, the Athlon 64 X2 4600+ is still about 3% to 5% faster.

Nevertheless, that 3% to 5% benefit is currently going to cost you about a 20% price premium. And, as you stated yourself, you will also lose a full 1MB of L2 cache, 512K per core. The extra 512K of cache that the 4400+ has on each of its Athlon 64 cores only actually come in handy in gaming scenarios where the 4400+ is almost on par performance-wise with the 4600+. Another spot where the extra cache could come in handy is heavy-duty multitasking scenarios; a situation a guy like you will most likely find yourself in eventually. So the "PC enthusiast" side of us says don't waste the extra money on the 4600+, especially because you'll be losing 512K of L2 cache per core. But the dry and conservative "professional" in us says the numbers are what they are with respect to 3D rendering and modeling workloads in applications such as Maya. Here the Athlon 64 X2 4600+ posts scores very much consistent with its higher performance rating and branding.

Anne-Marie asked: I've just come across a warning in a Dell Product Information Guide, and I was wondering just how serious a health hazard it is. The warning goes as follows:

"Handling the cord on this product, or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause birth defects or other reproductive harm. Wash your hands after handling the cord."

Do all computers sold in the USA contain lead? Do I really have something to worry about here? As many electric cords as I have handled, I've never seen this type of warning. Why would Dell put this warning in its Guide if not for a definite reason?

Motherboard manufacturer Asus is already saying that their products are fully lead-free and RoHS compliant.

A: Was this label on a new Dell PC? Perhaps the monitor cable? Certainly this is a very strong statement regarding something as simple as a cord. Unless the lead is exposed to your skin (power, monitor, and other PC cords are usually encased in plastic to help avoid any lead exposure to skin) or you ingest it, there's little risk. The fact of the matter is that all computers and almost anything electronic contain lead for shielding cables and in the chips and solder that make up a circuit board. Generally all chip mounting is done these days with a tin/lead compound that helps to adhere the chip to the circuit board. But you don't eat circuit boards or even eat off them, so there shouldn't be much to worry about.

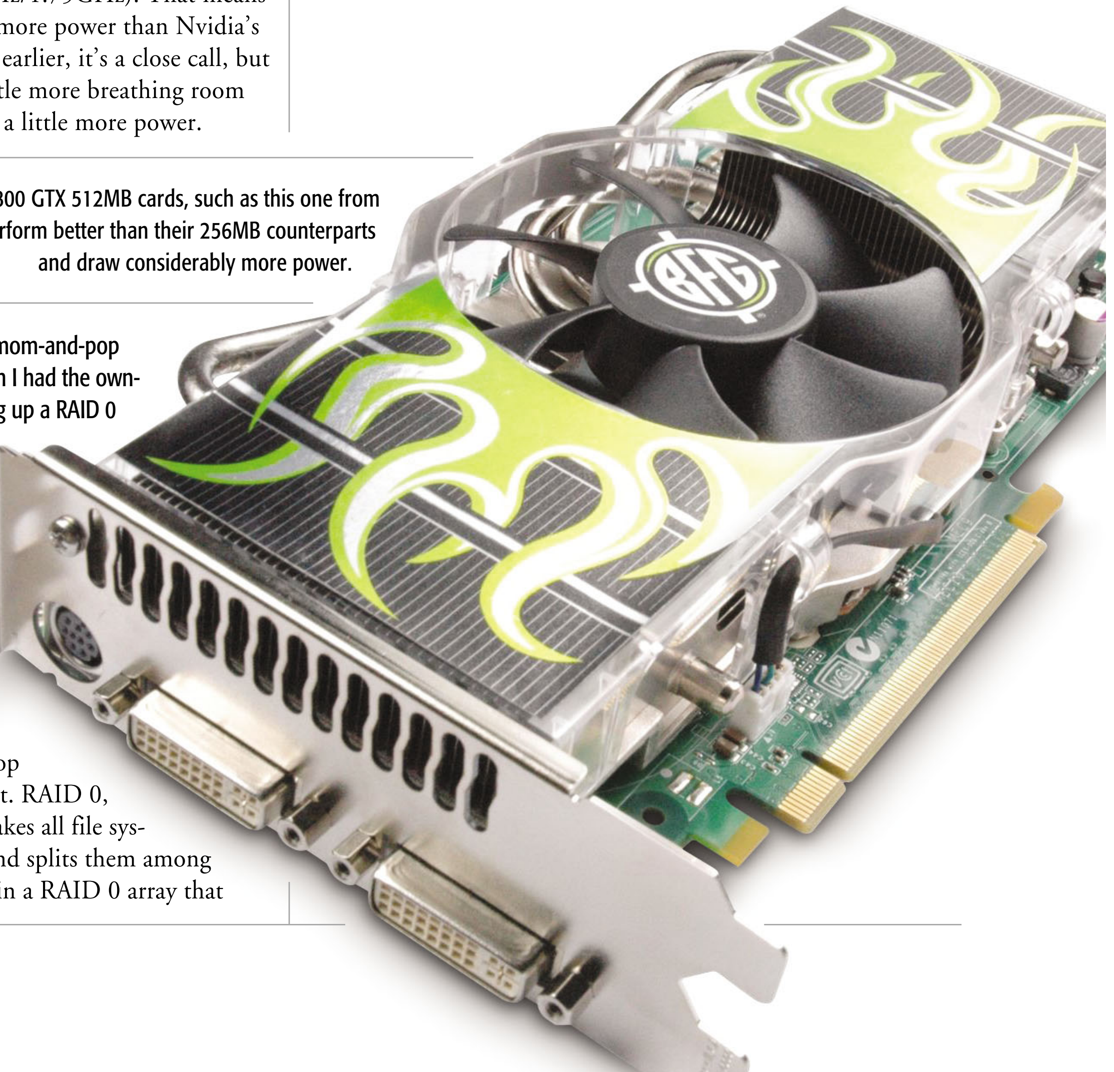
If you're still worried, however, there's a new regulatory standard called RoHS (Restriction of Hazardous Substances) being adopted by the United States that will rid consumer electroinc equipment being shipped to Eurpoean countries of lead by July 2006. The United States and other countires will also soon follow suit. This restriction calls out the following: The product or part may not contain any of the following substances in excess of the following maximum concentration values in any homogeneous material, unless the substance is in an application that is exempt under RoHS: (a) 0.1% (by weight) for lead, mercury, hexavalent chromium, polybrominated biphenyls, or polybrominated diphenylethers; or (b) 0.01% (by weight) for cadmium. There are exemptions in the Datacom, Telecom, Storage, and other markets, but for consumer products there's an entire industry being built in support of the RoHS initiative.

Accordingly, the RoHS plan is mainly targeted at helping those of us who use electronic devices and equipment dispose of these things properly so that lead and other toxic substances don't build up further in landfills. But what Dell's doing here with regard to the power cord warning is the proverbial "cover your butt" statement. In fact, there's no hard evidence to our knowledge that lead has ever leeched, been absorbed, or otherwise transferred to humans via electronic components. Again, other than touching a circuit board, monitor, or power cord, you'd have to scrape off the lead on one of these devices and inhale the dust, eat it, or find another way of getting it into your bloodstream to have it affect you. Lead is heavy, but it doesn't transfer easily. If it did, we would have heard of the concern awhile ago because it's in virtually everything with an electrical printed circuit board, heavy-duty display cord, and many other types of electronics. Open up that new Dell PC, plug it in, and enjoy. Future versions of Dell PCs will undoubtedly come lead-free, but the machine you have now won't hurt you or your family—unless you're into ingesting computer parts.

Bryan B. asked: I just read your review of the Nvidia GeForce 7800 GTX 512MB (fine work, by the way) and have a quick question. I'm building a system with the same A8N32-SLI motherboard you used for testing, plus two BFG GeForce 7800 GTX 512MB cards, three hard drives, and two DVD burners. I currently have PC Power & Cooling's Turbo-Cool 510 SLI power supply that seemed really powerful until the company came out with its 850W model and now the 1KW model! I'm just wondering if my "little" 510 SLI will be enough to power the hardware I've described? Thanks very much.

A: Thanks for the support, Bryan. We appreciate it. In that review we also used a PC Power & Cooling Turbo-Cool 510 SLI to power our test system and didn't run into any problems at all. Our test system, however, was a lean, mean, benchmarking machine with only a single hard drive and a single optical drive installed. The machine you described will be far more power hungry than what we used for testing, though, so we think your Turbo-Cool 510 may be cutting it close.

While we were evaluating Nvidia's GeForce 7800 GTX 512MB cards in single-card and dual-card SLI configurations, we used a Seasonic power meter to monitor the total power consumption of our entire test system, excluding the monitor. If you were using only a single GeForce 7800 GTX 512MB card, you'd be fine, as our test system never consumed more than 330W. Power consumption, however, increases when you install two cards. When our test system was sitting idle at the Windows Desktop with a pair of 512MB GTX cards installed, it consumed almost 240W of power. And when we threw a heavy 3D workload at the pair of cards running in SLI mode, power consumption shot all the way up to over 410W. With a heavy 3D workload and significant hard drive activity, power consumption would only increase from there. So we figure you've got less than 100W to spare for your two additional hard drives and second DVD burner. Plus, you have to keep in mind that those BFG cards you're looking at have their GPU core and memory clocked higher than the reference boards we tested (550MHz/1.7GHz vs. 580MHz/1.75GHz). That means the BFG cards will draw marginally more power than Nvidia's reference cards, as well. Like we said earlier, it's a close call, but it would be best to give yourself a little more breathing room and go with a PSU that can serve up a little more power.



GeForce 7800 GTX 512MB cards, such as this one from BFG, perform better than their 256MB counterparts and draw considerably more power.

A.J.C. asked: I was recently at a local mom-and-pop computer shop selecting parts for a system I had the owners build, and they talked me out of setting up a RAID 0 array on my new system. They said that setting up a RAID 0 array would be faster for some things, but that there's a higher risk of losing my files if there's a problem. I thought RAID 0 was the way to go for high performance; what's the deal here?

A: This may come as a surprise, but the local mom-and-pop shop owners you mention are actually right. RAID 0, or striping as it's commonly called, takes all file system data read and write operations and splits them among the drives in the array. For example, in a RAID 0 array that consists of two hard drives, when a 1MB file is written to the array, half of the file is stored on the first drive while the other half is simultaneously stored on the second. To put it simply, in a two-drive RAID 0 array all of the data is split between the two drives, so under ideal conditions it would theoretically take half the time to write or read any given file than it would on a single drive. Splitting the workload between two drives like this can increase performance in many intensive file system operations, but it also essentially doubles your chances of data loss due to a drive failure. Because the data is split among all of the drives in a RAID 0 array, if only one drive fails, the entire array goes down, and you won't be able to access any of your data. Basically, the more drives in a RAID 0 array, the better the chances are for data loss because there's a greater likelihood that at least one drive in the array will fail over time.

There are other RAID modes that address RAID 0's shortcoming, such as RAID 1 (mirroring), RAID 0+1 (striping and mirroring), or RAID 5 (striping with parity data), among many others modes, but there are pros and cons to each. If you're happy with the way your system is performing without RAID 0, then just leave it as is. You probably wouldn't perceive the performance benefits of a RAID 0 array unless you're constantly moving or copying very large files. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com

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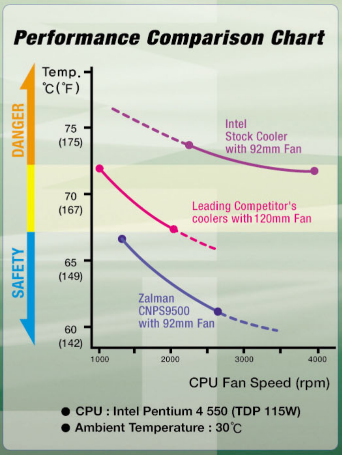
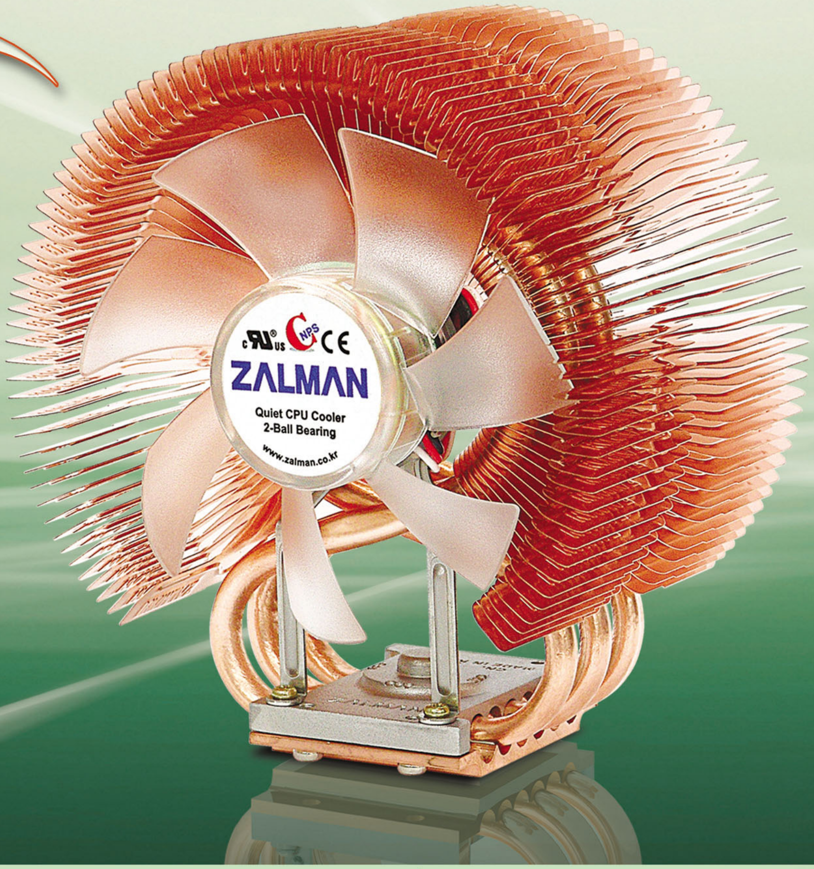


- CPU : Intel Pentium 4 550 (TDP 115W)
- Ambient Temperature : 30℃

Intel P4 (Socket 775/478)
AMD (Socket 754/939/940)



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Chips Cool Down

Chip-Cooling Technologies Continue To Develop

Personal trainers will tell you that one of the most important parts of your workout is the cool-down period. It gives you a chance to gradually throttle down your muscles' workload and avoid injuries. This is good for the body, but what about those "muscles" in your computer? Do your PC's chips, such as the CPU, memory, GPU, or other components, get a cool-down period when they generate heat and after their "workout"?

Cool Down While Heating Up

Unfortunately, computer chips don't get a cool-down period after working hard; therefore, chips must cool down while working, or they'll break.

Also, if you want to overclock your chips, heat problems will only increase, so you'd better have good, reliable cooling methods waiting in the wings. Fortunately, there are several options for providing cooling, ranging from the standard heatsink and fans to more exotic methods, such as water-cooling and heatpipe coolers.

Corporate & Educational Chip Cooling

As the issue of overheated chips continues to grow, many companies have developed and are developing

Cooling Hot Spots

Engineers and developers use thermal engineering to help them determine the best methods for cooling a computer's case and chips. Thermal engineering not only looks at the components used to cool the chips, but also at the overall layout of the computer case, allowing for the best airflow through the case and for the most logical placement of components that generate heat.

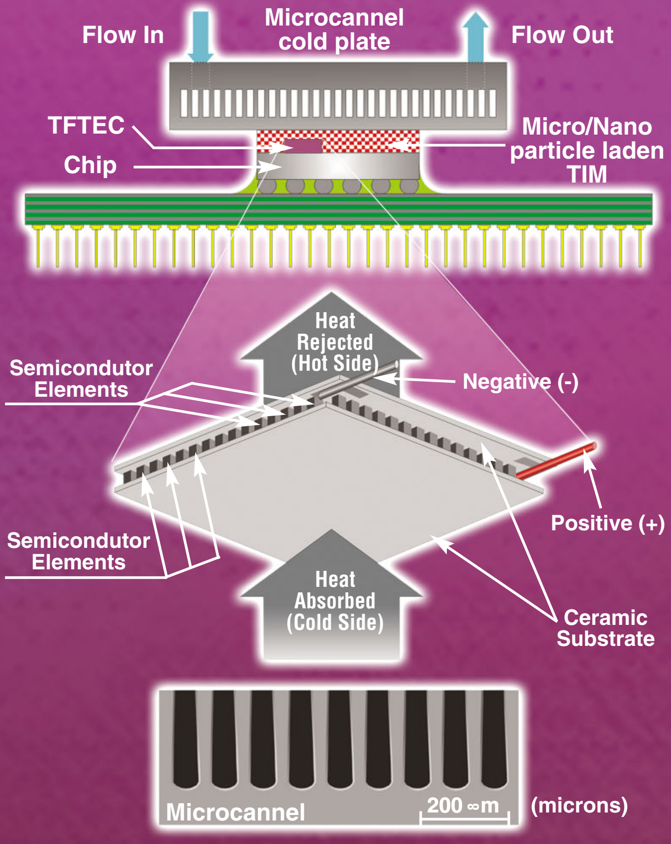
However, as cases shrink while they take on more components, thermal engineers face more and more challenges for cooling the inside of the cases. Such challenges have sparked Intel to develop new ways to use existing components to move heat away from the chip.

TFTEC. A TFTEC (Thin Film Thermoelectric Cooler) would cool hot spots on a chip. The TFTEC material would be extremely thin and would have nanocomposites located directly above any hot spots on the chip.

The idea of TEC (thermoelectric coolers) has existed for almost two centuries. When electrical current flows through two conductors, heat in one conductor is pulled away and moved toward the other conductor. Intel hopes to apply this idea to a TFTEC on a nano-scale, which will help precisely cool a tiny area on a chip. (The illustration of TEC on the right is a generic representation of how TEC works.) One concern, however, is that additional electrical power used to run the TFTEC would generate extra heat.

TIM. Intel also is working to improve TIMs (Thermal Interface Materials), such as thermal grease and phase-change substances. To improve the TIMs already in use, Intel is studying how to add nano-sized particles to the current micron-sized particles to more efficiently draw heat away from the processor. The variation in particle sizes may be the key to removing the heat. Before such a technology is feasible, Intel researchers say they need to determine the best mixture of nano- and micron-sized particles for optimum performance.

Microchannels. The idea of using microchannels for cooling has existed for more than two decades. Many companies have experimented with microchannels specifically to cool chips, including specialty chipmaker Cooligy (www.cooligy.com), which has developed technologies to cool chips by moving water through microchannels using electrokinetic pumps. To achieve maximum cooling efficiency, Intel's experimenting with several types of cooling liquids (other than water) inside the microchannels. ▲



Source: Intel

new chip-cooling technologies. For instance, in the "Cooling Hot Spots" sidebar, you can read about some of the chip-cooling technologies Intel's currently researching and testing.

An emphasis on chip cooling is showing up in the educational world, as well. Researchers at Purdue University have proposed creating a Center For Electrothermal Co-Design Of Future Electronics, which would let researchers and students identify, understand, and solve future and current chip-cooling issues. Suresh Garimella, a professor of mechanical engineering at Purdue who's heading the idea of the center, says chips in another decade or two could have hot spots that generate about 2,000W of heat per square centimeter. To deal with these hot spots, it's important for electrical and thermal engineers to work closely with each other in all aspects of chip design, including lowering power requirements. The proposal is awaiting approval by the National Science Foundation; researchers hope to begin operations in mid-2006.

Chilly Chips Your Way

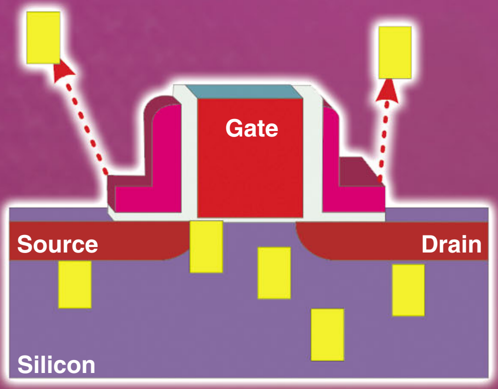
Good chip-cooling ideas certainly aren't limited to corporations and universities; the up-and-coming ideas concerning cooling may come from individuals like you. Many modders are successfully cooling down their PCs and components by creating their own cooling systems. (Check out "Mad Reader Mod" on page 40 in the June 2005 issue of *CPU* for one chilly cooling idea.) With a little ingenuity, developing methods for cooling down your computer can be almost as enjoyable as generating heat when pushing your PC to its limits. And, just maybe, your ideas will spark the next generation of chip-cooling technologies. ▲

by Kyle Schurman

Bring On The Heat

Computer chips, whether they're RAM chips, CPUs, or others, generate heat as they work. As millions of pulses of electrons representing bits of data move through the chips, they generate heat for a few different reasons.

Recording a bit. When an electrical pulse enters a transistor to record a bit, it generates heat. Electrons move from the source to the drain as the transistor is turned on or off, and some of those electrons leak away from the transistor as heat energy (diagram on the right).



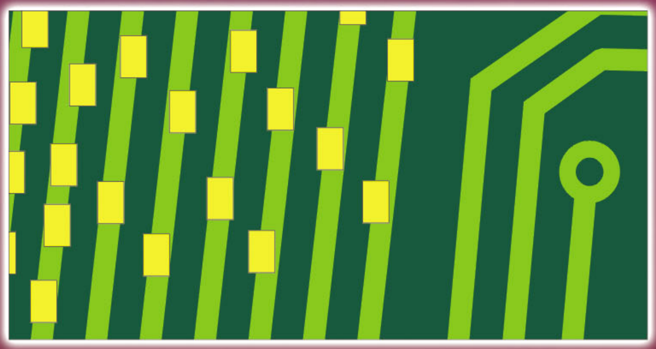
More power. The process of turning a transistor on and off requires electrical power. The more transistors that are involved, the more power the process requires. The use of power, of course, generates heat.

Moving pulses. As the electrical pulses move through the circuits and transistors of the chip (bottom diagram), some friction naturally occurs, which generates heat. Because the edges of the circuits contain microscopic imperfections, the pulse may "bump" into the edges of the circuit from time to time, and these collisions also generate heat.

More speed. If you choose to overclock your PC's chips, you'll generate more heat because you're moving more pulses through the chip and turning more transistors on and off.

As the chip generates heat, several problems can occur. Stray heat can affect nearby transistors, causing random calculation errors. The system might run slower as the heat builds up. A continuous buildup of heat can physically damage a chip, from weakening the junctions on the transistor gates to melting circuitry.

With many newer chips, the system slows down or even shuts down before overheating causes a complete meltdown, but even short exposures to intense heat can cause permanent damage to a chip's components. ▲



Sources: Intel, Marlow, Thermalloy

Maximum CPU Temperatures

Several resources on the Web can help you find the recommended maximum operating temperature for your processor. You also should be able to find maximum temperatures for all types of chips in the user manual or at the manufacturer's Web site.

Intel (processorfinder.intel.com/scripts/default.asp)
Select your processor from the Processor Family drop-down menu and click Go.

AMD (www.amdcompare.com/us-en/desktop)
Select your processor or model number from the Processor or Model Number drop-down menu.

Heatsink-Guide (www.heatsink-guide.com)
Click the CPU Temperatures link along the left side of the screen to see the list of chips.

Processor Electrical Specifications (users.erols.com/chare/elec.htm)
This site contains a good list of old and new processors from several manufacturers.

NAND Flash Memory

The Future In Flash Is Growing Fast

Flash memory's early days in the late 1980s didn't exactly conjure thoughts of speedy growth. Had DC Comics superhero The Flash, with his superhuman speed, been asked to be a flash memory spokesperson back then, he likely couldn't have answered "no" fast enough. Things were moving too slowly.

That's no longer the case today. As handheld devices have exploded into the consumer market in recent years, flash memory has grown into an indispensable part of it.

But even with all of the brands and technologies in the overall flash memory market, there's a superhero that currently stands out: NAND flash memory. IDC projects sales of hard drives for consumer electronics, many of which will make use of NAND flash, will grow 34% through 2008, while traditional hard drives for computers will grow only 4% during the same period. In a study last year, Semico Research predicted sales of NAND would grow by 39% annually through 2008. According to iSuppli, the overall flash memory market should total $20.6 billion in 2006, and NAND will hold the majority of the dollars in the market.

Flash's Beginnings

Intel introduced NOR flash chips in 1988, and Toshiba and Samsung introduced NAND flash in 1989. NOR eventually dominated the market, surpassing the use of EPROM and EEPROM memory. The early flash market grew slowly. But, as the storage and performance demands for flash memory has significantly increased in the past few years, NAND technology has moved to the forefront.

Flash memory is found in products such as PDAs, cell phones, digital cameras, MP3 players, GPS navigation devices, and informational displays. Samsung, Spansion, Toshiba, and Intel are some of the world's leading flash memory manufacturers.

Changes to cell phones have driven many of the changes in the flash memory marketplace. As cell phones add more and more multimedia and Web browsing features, flash memory manufacturers have been asked to provide memory products that are smaller, have higher densities, and cost less.

Those desires to provide small, high-density, inexpensive flash memory products are at the heart of the industry shift from NOR to NAND flash technology, which started when NAND technology appeared in high-end phones in 2001. Prior to that, NOR flash exclusively appeared in cell phones. Manufacturers primarily continue to use NOR flash in low-end phones, which don't usually have the high-capacity and high-performance memory needs that NAND provides.

NAND Takes Charge

NAND's growth in market share has occurred in large part due to its extremely fast growth in capacity levels. NAND now

NAND's Cost

Late in 2005 Samsung's semiconductor CEO, Dr. Chang Gyu Hwang, made a prediction: NAND flash chips would eventually replace traditional hard drives. At the time of his announcement, Samsung had introduced a 16Gb NAND flash chip using a 50nm manufacturing process. Hwang said it was only a matter of time before notebooks using an array of flash memory chips, rather than a hard drive, appeared on the market.

There's no debating the amazing growths in NAND, both in market share and in technological advancements. However, NAND appears to have a long way to go before it's a financially viable alternative to traditional hard drives.

When comparing NAND prices per gigabyte, keep in mind that the listed prices are those that OEMs pay, which almost always are lower than retail prices. Also keep in mind that NAND flash chips are measured in gigabits, which have one-eighth the storage size of the same number of gigabytes.

One final item to note about NAND flash prices: They're falling fast. The NAND prices listed here are 30% to 40% lower than they were at the beginning of 2005. If prices continue to fall quickly while capacities grow just as quickly, the idea of NAND flash memory chips eventually replacing hard drives in notebooks might not be implausible.

NAND
8Gb NAND flash; $40 to $45
4Gb NAND flash; $20 to $25
2Gb NAND flash; $10 to $15

About $5 to $7 per gigabit, or $40 to $56 per gigabyte

(*NOTE: NAND prices are contract prices from November 2005, not retail.*)

USB Flash Drives (retail prices)
SanDisk USB 2GB flash; $110
SanDisk USB 1GB flash; $70
Memorex USB 512MB flash; $40

About $55 to $75 per gigabyte

Hard Drives (retail prices)

External
Maxtor 300GB; $246
SimpleTech 160GB; $131
Western Digital 80GB; $93

About 80 cents to $1.15 per gigabyte

Internal
Hitachi 400GB; $260
Western Digital 250GB; $150
Seagate 160GB; $98

About 60 to 70 cents per gigabyte

Sources: DRAMeXchange, DigiTimes, inSpectrum Tech, Amazon.com appears in 16Gb memory chips, which is a substantial improvement over the 1Gb chips from a couple of years ago.

Manufacturers are fueling the growth, as well, now regularly using a 70nm manufacturing process vs. the 130nm process used a few years ago. And recently developers have been using a 50nm process. These changes let manufacturers develop NAND chips more precisely, enabling higher capacities and improved performance.

Applications typically can read NOR data more quickly than NAND; however, NAND writes and erases data much faster than NOR (an important benefit for the growing amount of data in this world). NOR's configuration is somewhat similar to RAM, where each byte is easily accessible. NAND's configuration, on the other hand, is more similar to a hard drive, where the system reads and writes data in blocks, letting it operate faster than NOR. NAND's configuration makes it more conducive to data storage than NOR, which is better for running code.

Another key component in NAND's growth vs. NOR is the advent of EFD (embedded flash drive) architectures. Essentially, EFDs let any existing chipset take advantage of new generations of NAND flash products and avoid some of the problems that NAND experiences. For example, raw NAND is more prone to errors than NOR; using EFD technology with NAND limits those errors.

Because chipset technology typically lags behind the advancements in NAND, manufacturers use EFD to let older chipsets take advantage of newer NAND features such as MLC (multi-level cell) technology.

NAND flash also is appearing in HHDs (Hybrid Hard Drives), which let the drive use less power and work with fewer delays. Samsung and Microsoft are leading development of the drive that will work with Microsoft's upcoming Vista OS. (See "Hard Drive & Flash Memeory: A Perfect Match" on page 42 in the August 2005 issue of *CPU* for more information.)

Intel Joins NAND

Perhaps the final blow for NOR flash came in November 2005 when Intel, which created NOR, decided to support NAND. Intel and Micron joined forces to invest about $5.2 billion over three years in NAND technology and research through a joint venture called IM Flash Technologies.

Another reason Intel may have jumped into the NAND market is because of the possibility of using NAND flash to speed up the boot process for notebook computers and, in turn, creating instant-on

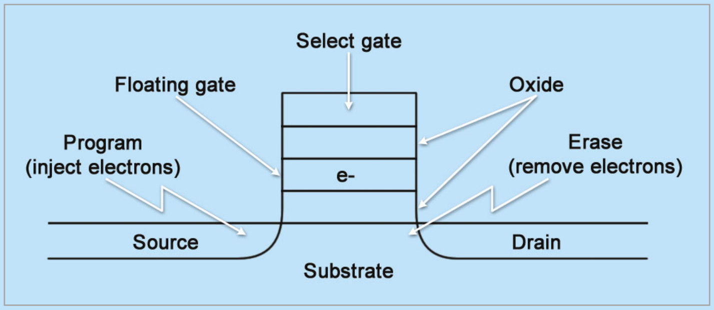
Flash Memory Basics

Data in most flash memory chips is stored in a transistor.

The cell's charge (e-) is injected into the source and then moves from the source into the FG (floating gate) where it's stored. To erase a bit, the charge moves out of the FG into the substrate.

When the charge is injected into the cell's FG, called programming the cell, it contains a 0. Removing the charge from the FG, called erasing the cell, changes the cell to a 1.

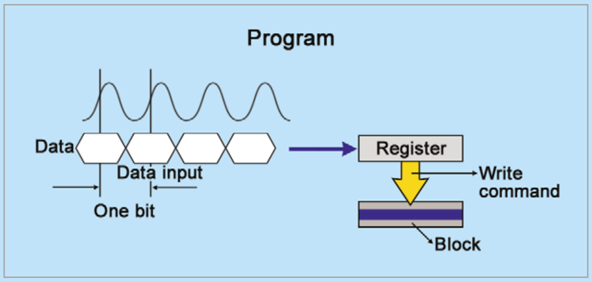
The data stored in the cells can't change at random, other than by an error because flash memory is created to program and erase bits in large amounts.

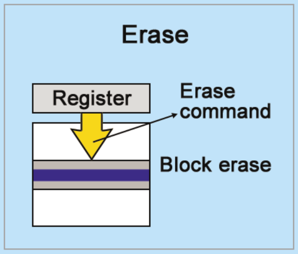


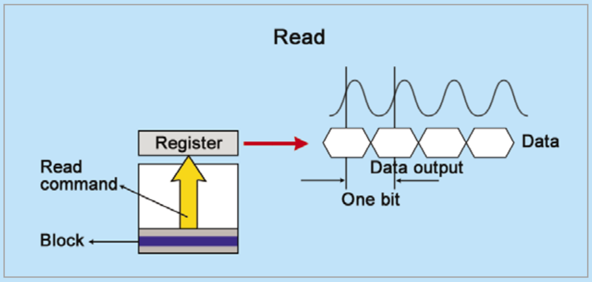
Program. The process of programming the cell can only change the data from a 1 to a 0, not vice versa. The memory controller issues a write command for the block address, and the bits go into a register area. Once the register is full, the bits are written to the cells. The entire writing process takes less than one millisecond.

Erase. When erasing the cell, the memory controller specifies the exact block address of the cell and issues an erase command. A block erase requires about two milliseconds (with 90nm technology).

Read. When reading data from a cell, the memory controller accesses the block address and copies the data into an output register. The memory controller then reads the data from the output register. ▲







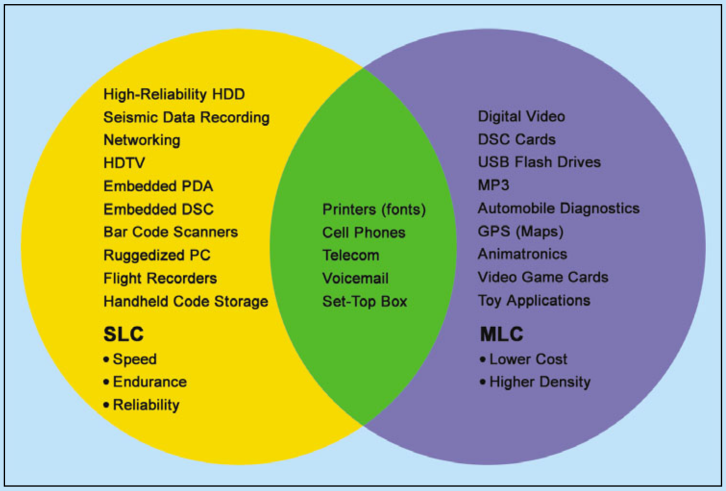
Sources: Toshiba, Wireless Systems Design, EDN computing. The boot process for a notebook with flash would only take a matter of seconds, saving battery power.

With Intel's backing, it's logical to assume NAND will begin appearing more often in computers. Intel could make NAND flash work directly with its processors, which would let them take full advantage of the abilities of NAND flash. NAND could also spark new applications in computers with Intel's support. In the future NAND could become the removable storage medium of choice instead of traditional removable hard drives and could become the primary storage medium *inside* the portable computer.

A NAND Flash Revolution?

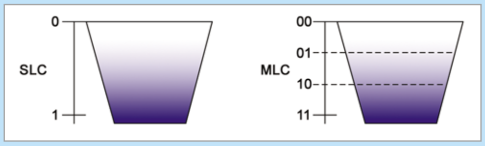
In September 2005 Apple announced that the iPod nano would use NAND flash chips; shortly thereafter Samsung's

SLC NAND vs. MLC NAND



The 2003 introduction of MLC (multi-level cell) NAND for use as an internal memory product by Toshiba and M-Systems played a big role in the growth of NAND flash. (Intel introduced the idea of MLC flash with its StrataFlash technology in 1997, but it worked with NOR flash. Since then, several variations of MLC flash have appeared in NOR and NAND flash.)

Unlike SLC (single-level cell) technology, which stores one bit per cell, MLC (multi-level cell) technology stores two bits per cell. This gives SLC NAND a slight edge in certain applications over the slower and less reliable MLC NAND. MLC NAND's larger storage capacity (as a result of higher density), however, more than makes up for these shortcomings. Also, recent advancements in software and hardware have helped improve the reliability and performance of MLC NAND. Reliability, performance, and storage capacity aside, both SLC and MLC have specific roles in which each one is more useful than the other. (See the comparison circles on the upper-left side.)



To further understand NAND flash, you can think of it like a glass of water (as shown above). SLC has two levels: empty (erased or 1) and full (programmed or 0). Consequently, it's easy for the read command to quickly determine the exact state of the cell.

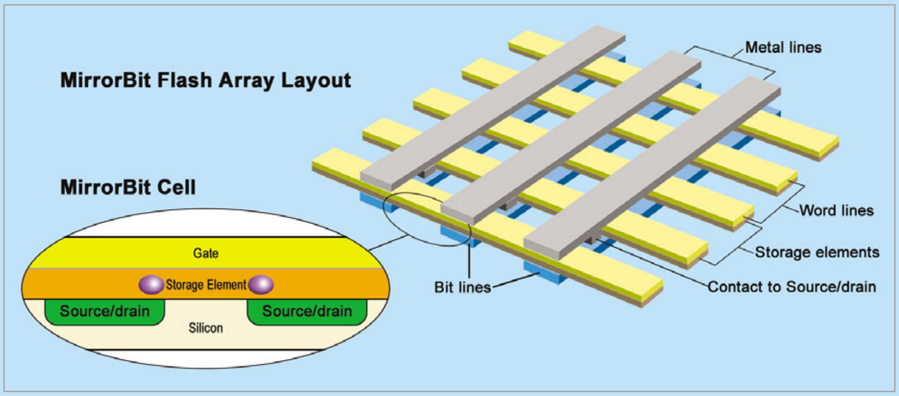
MLC has four levels: empty (erased), 1/3 full, 2/3 full, and full (programmed). And, therefore, the read application must take some extra time to determine the exact reading of the cell. Of course, much of that extra time spent reading is saved later because MLC cells store two bits each. ▲

Sources: Toshiba, EDN

MirrorBit Technology

MirrorBit technology from Spansion (a company formed by AMD and Fujitsu) stores two bits per NOR flash memory cell and uses a slightly different storage technology than the floating-gate technologies NAND flash uses. In MirrorBit technology, a bit is stored on each side of the storage element within the cell, letting it hold two bits. The technology can read or program each side of the cell independently, meaning the MirrorBit NOR flash chip essentially doubles its storage size vs. traditional NOR flash chips.

Spansion seemed to be a promising financial venture for AMD and Fujitsu in 2003. But, recent market inroads made by NAND flash technologies have some financial analysts worried about the future of NOR-based technologies. Spansion, however, will continue to make improvements to its MirrorBit technologies and attempt to carve out a strong foothold in the flash memory marketplace. For example, Spansion demonstrated a new 1Gb MirrorBit device at the 3G World Congress late in 2005. ▲



Sources: AMD, Spansion

semiconductor CEO, Dr. Chang Gyu Hwang, forecasted the impending death of micro hard drives in mobile devices.

Not surprisingly, however, companies creating micro hard drives aren't giving in to the idea of a NAND revolution. For example, Toshiba, which is among the world's leading manufacturers of both NAND flash chips and micro hard drives, has no plans to stop making micro hard drives.

Still, as NAND flash chips prices drop and storage capacity grows, they'll definitely challenge micro hard drives, and other types of traditional storage technologies, in the storage arena.

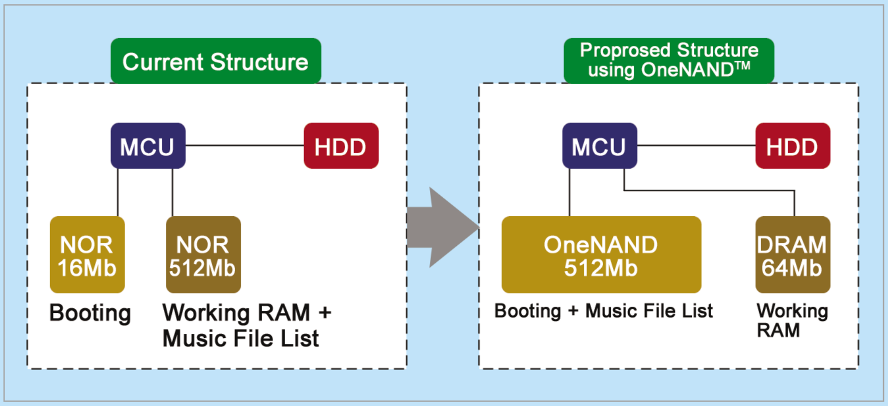
Seemingly, NAND couldn't be moving forward any quicker. The Flash would be proud. ▲

by Kyle Schurman

NAND's Function In An MP3 Player

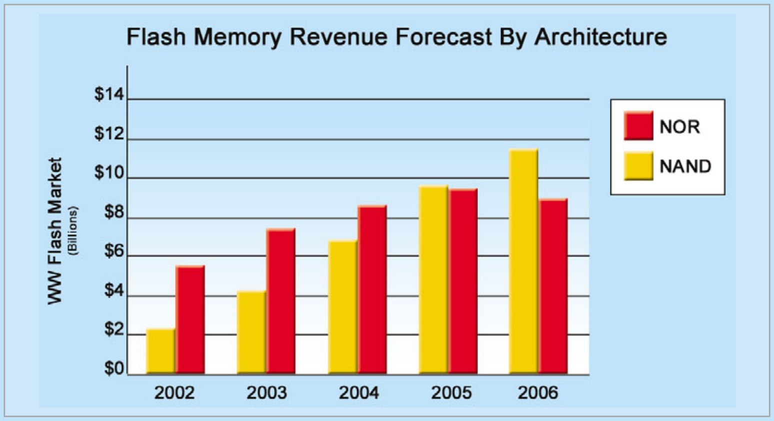
In MP3 players NAND flash memory is replacing NOR because NAND is more versatile. This diagram demonstrates how NAND (specifically OneNAND from Samsung) can replace NOR by booting the MP3 player, but it also can replace a large chunk of the DRAM the MP3 player uses for storing music files. The DRAM then can serve as working memory only. Furthermore, NAND can work directly with the MCU (MicroControl Unit), just like NOR. ▲

Source: Samsung


Current Structure
MCU
HDD
NOR 16Mb
NOR 512Mb
Booting
Working RAM + Music File List
Proprosed Structure using OneNAND™
MCU
HDD
OneNAND 512Mb
DRAM 64Mb
Booting + Music File List
Working RAM

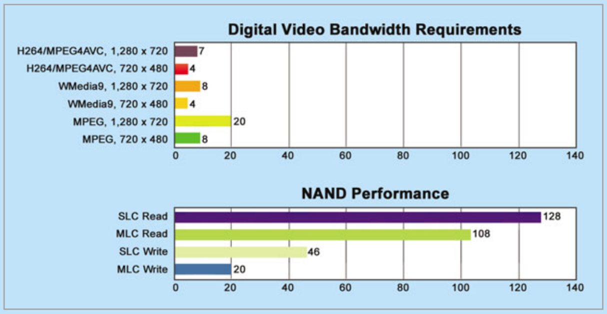
NAND overtook NOR in market share in late 2005, and analysts from iSuppli and Samsung predict that NAND's market share will continue to surpass NOR in the next couple of years. ▲

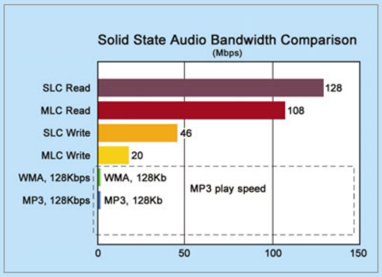
Sources: iSuppli, Samsung



One of the benefits NAND flash chips provide is the ability to run at bandwidth speeds high enough to handle most video and audio streams.

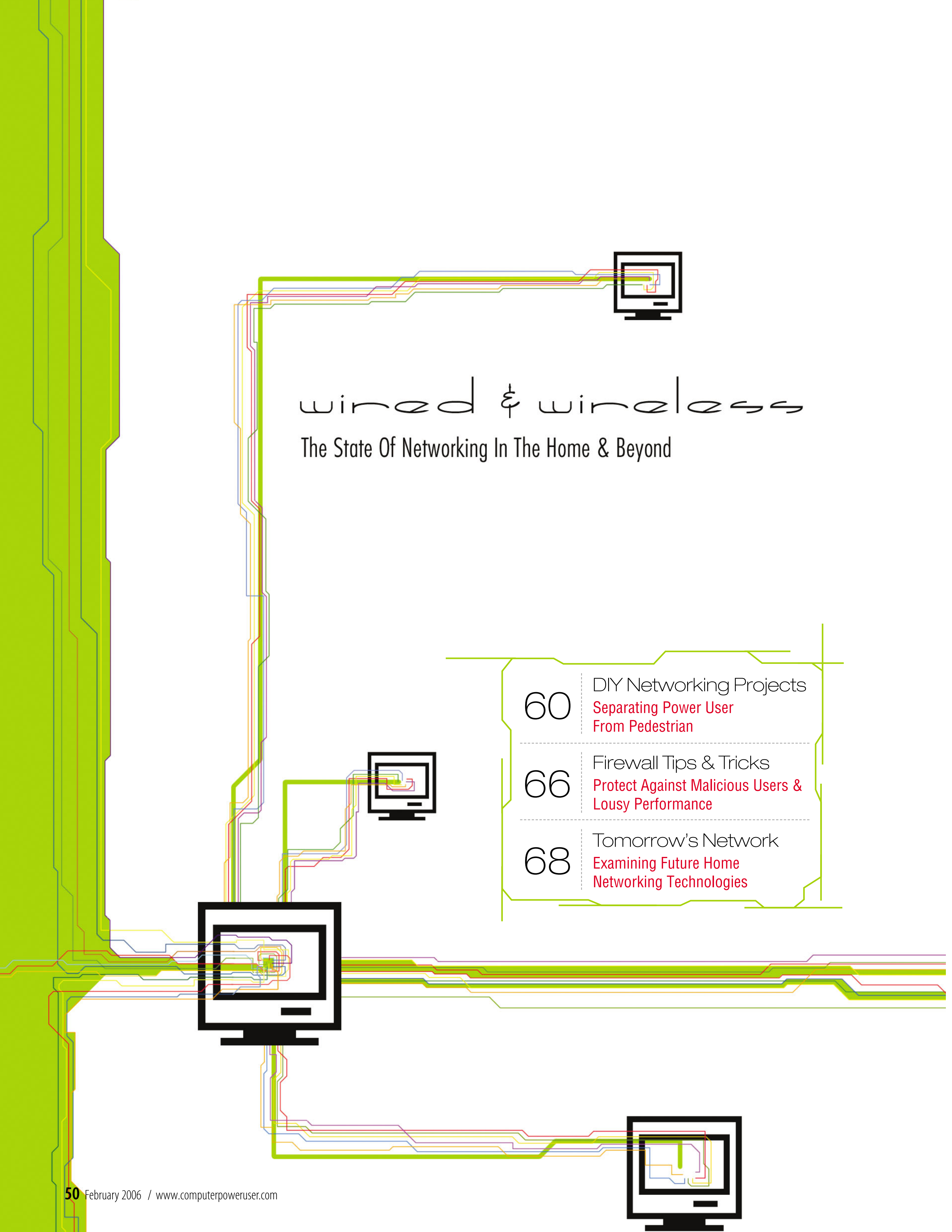
As NAND flash becomes increasingly inseparable from handheld devices, and as these devices run more and more audio and video, NAND's speed and performance will be very noticeable. ▲





NAND bandwidth speeds here are the maximum possible speeds.

Source: Toshiba



wired & wireless

The State Of Networking In The Home & Beyond

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Separating Power User From Pedestrian

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Examining Future Home Networking Technologies

There's nothing finer than new construction and the "structured wiring" within it. When you build a home, you get to say exactly where you want your data drops. Den? Garage? Every bathroom? No problem. Stick in a dozen or so Gigabit Ethernet CAT 5e or CAT 6 outlets all wired back to your tech closet, and you're set for whatever high-bandwidth gadgetry the world might devise.

According to some estimates, over 25% of all U.S. homes now being built have structured wiring, or preinstalled data wiring, and the structured wiring market is now into double-digit annual growth. According to KMI Research, this growth will continue and transition in large part over to fiber by 2008. Of course, if you can't afford a new house, much less the $200 to $300 per outlet to build in your hard wiring, don't fret. Increasingly, apartment buildings today are also offering prewired broadband and structured wiring.

Still stuck without high-speed structured wiring and no prospects of getting it soon? Join the party. Most of us who have long stretches of CAT5 snaking across our floors have two choices: grab a drill, install our own wall wiring, and pray we don't have asbestos insulation or throw up a wireless LAN. Do-it-yourselfers may prefer the first route. And in the days of 802.11b, sweltering in a 110-degree attic to string wire was justifiable. Today, the situation is changing. Wireless is getting better, stronger, faster, and the setup cost is a lot closer to $6 than $6 million. But there's a lot more to the network scene today than when you first whipped out your Wi-Fi and 10/100.

"Home networking moved out of the enthusiast class some time ago," says Michael Wolf, principal analyst with ABI Research. "You now have a huge number of networked homes. The more advanced consumers are now moving into multimedia networking. They are experimenting with high-speed, such as MIMO [Multiple Input Multiple Output], and connecting CE devices. They're using media center software to record shows and get content in and out of the living room using things like a networked game console, a Sonos, a DMA, even TivoToGo."

ABI numbers reveal that 62.8 million households worldwide were networked in 2005. Of that number, however, only 4 million had yet adapted into Wolf's definition of a multimedia network. By 2008 these numbers are predicted to expand to 139.8 million and 21 million, respectively. However, Microsoft has now sold over 4 million copies of Windows XP Media Center Edition. Vista will only compound this with its greater provision for DRM and content management, plus a host of other technologies ranging from UPnP to Bluetooth are enabling even easier ways to slap multimedia devices onto the network. Could ABI's forecast for multimedia-focused LANs be quite conservative?

Such networks need to pay a lot more attention to QoS (quality of service) and sustained bandwidth, along with many other issues. Many people still feel that wireless, even in its newest MIMO incarnations, doesn't cut it. Let's take a closer look.

About That Bandwidth

Most enthusiasts will admit that sometime soon, we'll have several multimedia streams piping simultaneously throughout the home. You might have one HD video stream to the living room, another to the master bedroom, and two 5.1 music streams to each kid's room. Let's say all these streams are pumping out of one server device, so the pressure is all on one server and switch bottleneck. This ignores all other data traffic that might be simultaneously flowing through the LAN.

As with other forms of data access, each stream has its own average sustained data rate, but, more importantly, because many streams utilize VBR (variable bit rate) encoding, it also has a peak rate at the points where throughput spikes. If you have multiple streams passing along the same pipe, that pipe should allow for overlapping spikes, meaning points when the multiple peak rates may coincide to yield significantly higher than normal data rates.

A standard-def digital TV signal typically uses a VBR MPEG-2 scheme that delivers an average data rate between 2 and 3Mbps. Peak rates, however, spike to about 9Mbps. High-definition MPEG-2 TV streams—specifically cable- or satellite-based, not ATSC (Advanced Television Systems Committee) or over-the-air digital—peak between 13 and 19Mbps. Carriers can reduce this bit rate load by up to a factor of two through implementing better codec methods, but this tends to have a greater impact on average throughput than peak loads. "Trick modes," such as fast forwarding and reversing while still viewing the program, can increase peak loads by a factor of three or more. According to the MoCA (Multimedia over Coax Alliance), ATSC providers are required to allocate 19Mbps of bandwidth per stream regardless of whether or not it's actually needed. By the time you're done adding in 10% overhead for protocol management and up to 30% overhead for the buffering needed for fast channel changes, a many-stream multimedia home environment can easily face peak loads exceeding 150Mbps.

You now see why Fast Ethernet may be sufficient for today's single-stream users but will quickly hit a scaling ceiling as the multimedia market evolves. Similarly, today's Pre-N MIMO products under the best circumstances top out at around 40Mbps, and turbo mode iterations of 802.11g fare even worse.

Whither, Gigabit?

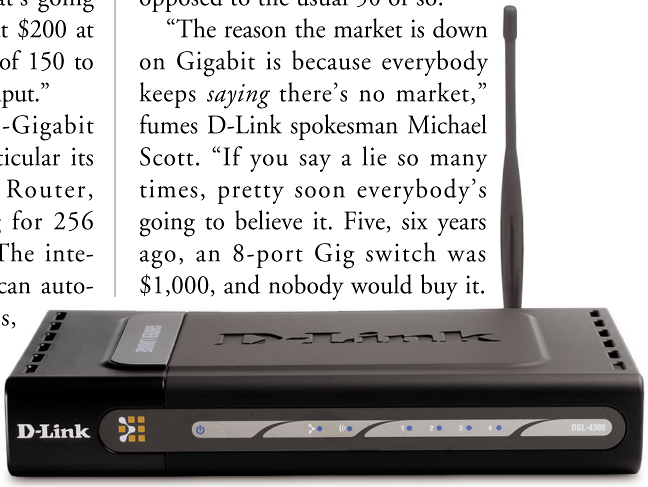
We've been stunned by the nearly ubiquitous belief among manufacturers that GbE (Gigabit Ethernet) isn't a consumer technology. This despite the overwhelming majority of structured wiring now going into new construction is at least GbE-capable and that even sub-$100 motherboards now offer Gigabit LAN ports. Maxtor told us that consumers weren't using Gigabit when the 10/100-based Shared Storage drive shipped several months ago. ABI's Wolf notes, "Is anyone actually using all that bandwidth? I really doubt it. I don't even know that you need [Gigabit] in the home."

Netgear's Vivek Pathela, senior director of product marketing, says, "Gigabit Ethernet is of very keen interest to the gaming community because they want the fastest possible connections, so there is no delay," but he agrees that 10/100 switches tend to have lower latency times. The real issue is packet prioritization and possessing flexible options for giving different types of traffic priority over others. Netgear's Gigabit desktop switches support 802.1p priority tags, but the implementation definitely isn't geared toward gamers.

Listening to Linksys' Eric Deming, product marketing manager, the problem with consumer Gigabit seems to be cost, and the buyers would rather take home one router that does everything than buy network components piecemeal. "It's still not that inexpensive to put GbE into a router," Deming says. "It's simple to put a Gigabit switch into a router, but you need higher processor speed and things like that to alleviate that bottleneck between wired and 108Mbps wireless. So we're talking to the silicon guys on ways to solve that problem. Having the right wired-to-wireless performance is still tricky today. That's going to push you from $150 to about $200 at retail and enable a real payload of 150 to 300Mbps of real TCP/IP throughput."

One exception to the anti-Gigabit crusade is D-Link, and in particular its DLG-4300 GamerLounge Router, which specializes in allowing for 256 levels of QoS prioritization. The integrated GamerFuel technology can automatically assign prioritizations, but users can go in and fine-tune a variety of application types, not just games. As Linksys' Deming warned, the DLG-4300 is more expensive owing to its higher-end components, but these also include a more powerful 5dBi antenna and ability to handle 2,000 concurrent wireless sessions as opposed to the usual 50 or so.

"The reason the market is down on Gigabit is because everybody keeps *saying* there's no market," fumes D-Link spokesman Michael Scott. "If you say a lie so many times, pretty soon everybody's going to believe it. Five, six years ago, an 8-port Gig switch was $1,000, and nobody would buy it.



D-Link GameLounge Router

Storage With (Nearly) Instant FTP

Sharing is caring, right? What good is a multimedia network if you can't centrally store content and share your (um, legal) files with friends and family? Email is useless for sending a 500MB video clip. You need an FTP server. You could go crazy with a dedicated Linux PC running a wad of hard drives and numerous FTP server apps. Or you could get smart and jack in a consumer NAS box with built-in FTP functionality, such as one of the following.

ADS Tech NAS Drive Kit

Compact and quiet, this aluminum enclosure offers considerable functionality if you can push past its roughhewn interface. The NAS Drive Kit uses a browser interface for device management. We received occasional errors from the ADS software thinking the box should be at 192.168.1.200 when DHCP actually assigned it to 192.168.1.21, but this was only a nuisance. As is usual with NAS devices, you can create new users, folders, and assign access rights to each. The device (which is SAMBA-compatible) can also function as an FTP and Web server and BitTorrent client.

The BitTorrent functionality is an interesting draw, even if you only download legal BT files. Rather than tie up your PC for hours on downloads, the enclosure can do it for you. Out of the box, though, BT downloading is extremely slow. ADS support has some configuration tweaks to improve this, but we didn't see them posted on ADS' site.

Similarly, ADS' documentation for setting up the product as an FTP server was vague and misleading. You're told to get a dynamic DNS address through a third-party site when one isn't needed, and the manual says to set up FTP port-forwarding via consulting your router's manual, but nowhere does any resource we saw explain what port forwarding is or does. Essentially, we plugged the cable modem's IP address into the ADS box's FTP configuration. In our Netgear router, we set up an FTP service port forward to 192.168.1.21, the NAS box's dynamic IP address. And that's it. Outsiders could then enter our modem's IP address in their browser window (format: ftp://xxx.xxx.xxx.xxx) and log in to the NAS drive's public folders. Easy if you know what you're looking for, but ADS needs to make this more obvious for newcomers.

The NAS Drive Kit mounts any parallel ATA drive and exhibited no audible vibration noise. From across the room, we couldn't hear the fan. A 2GB folder transfer to the drive's 10/100 port took 13:14 (minutes:seconds). A SATA option would've been appreciated for accommodating the new 400GB and higher drives, but the NAS Drive Kit is still a very affordable way to put a lot more mileage on your old PATA disks.

NAS Drive Kit

$130 • ADS Tech • www.adstech.com

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Buffalo Technology TeraStation

Call it the Godzilla of SOHO NAS. The 16-pound TeraStation feels like a steel safe but has enough LED indicators and fascia styling to keep it looking cool. Our 0.6TB model came with four 160GB Samsung drives for 445GB available in a RAID-5. With this, a 2GB transfer took 7:58 over the unit's Gigabit connection. You pay a performance penalty for the security of parity, but this is meant to be a backup box first and an FTP server a distant second. You can

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

Now, you can get an 8-port Gig switch for $79. Why on earth would you buy a 10/100 switch for $49? That's how far the price per Gig port has come down, and that's why you don't see 10/100 ports on any *real* motherboard anymore."

The Wireless Factor

Even with MIMO drawing all the headlines, D-Link's Scott notes that the technology still trails the standards-based products in sales. Products based on 802.11g are still far and away the sales leaders, with turbo versions splitting the glory fairly evenly with nonturbo. Businesses prefer to stick with standards, and today's Pre-N products will likely prove incompatible with the 802.11n standard generally expected to reach draft status by Q3.

To be clear, MIMO isn't the same thing as 802.11n. In radio MIMO is a system whereby multiple antennas are employed to leverage multipath propagation, or the phenomenon of one radio stream breaking into multiple ghost streams through reflection or refraction when encountering objects. With one antenna multipath propagation often damages signal clarity and performance. MIMO schemes use these multiple paths as nearly parallel data streams to increase throughput and error checking. The still-evolving 802.11n standard will use MIMO and has demonstrated up to 250Mbps throughput under ideal conditions. Other enhancements will include the WPA2 (Wi-Fi Protected Access) security features of 802.11i and the prioritization features of 802.11e.

"What's interesting about N is that there are a lot of options," says Linksys' Deming. "You can scale up and down based on the performance you want your product to have. For instance, you could do what's called a 4x4 combination on a router and go all the way down to a 1x2 combination, which is one transmitter and two receivers. It's a very scalable specification. We would likely build products to what they need to do, which is kind of a cool thing. And I think the Wi-Fi Alliance will help out greatly in making sense of this to consumers. You might expect to see qualifications saying this is a 'video router' or this is a 'data router.' There will be different routers for different things and different levels of performance each is geared toward. The difference is mainly in the antenna

TeraStation
$699 • Buffalo Technology • www.buffalotech.com
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reconfigure the four drives into two mirrored RAID-1s or a single-volume JBOD, plus tack on more storage to the unit's four USB ports. (You can also back up the NAS box to an attached USB drive.) The TeraStation also works as a print server, and there's a serial port for unattended shutdown by a UPS.

TeraStations also come in 1TB and 1.6TB models, and any can function as a media server when joined with Buffalo's LinkTheater. Buffalo bakes a backup tool into the firmware, throws a backup client on the software CD, and provides a trial version of Memeo's backup app. Disappointingly, we were able to get the TeraStation's FTP functionality running but couldn't get outsiders to see our folders set up for sharing. After many manual readings, setting tweaks, and 30 minutes holding for Buffalo's 24/7 tech support after 10 p.m., we gave up. The 0.6TB model's street price is about $650, which means you're paying just under $400 for the enclosure—not bad if you can get support to help finish set it up. As a network backup device, though, the TeraStation is a monster.

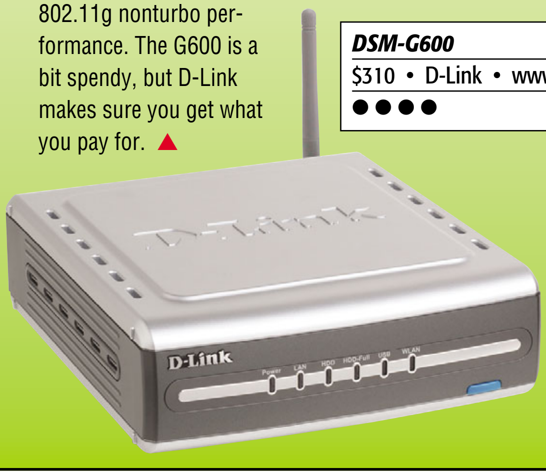
D-Link DSM-G600

If you thought the ADS NAS Drive Kit sounded appealing but you don't need the Web server or BitTorrent capabilities, feast your LAN on the DSM-G600. This PATA drive enclosure sports a GbE wired connection and 802.11g functionality as a client or access point (when wired to your router). D-Link's usual flair for simple, effective configuration menus (backed by very good documentation) makes short work in getting the G600 running as a FTP server and/or UPnP AV server, plus there are options for tweaking device performance.

We had two possibly related problems out of the box. First, the DHCP address for the device came consistently refreshed to 192.168.1.2, an address other devices on the LAN no doubt use. Second, D-Link's enclosure couldn't format our Maxtor DiamondMax 10 drive. A beta firmware update, plus picking a fixed, available IP address, solved both issues. We hit a small snag in the FTP Server Settings page when trying to select All Accounts when we should have picked Anonymous (the documentation is a bit scant here), and you don't want to enable root access simply for public file/folder sharing. Conversely, little perks abound, such as the two USB ports for additional storage, Nero BackItUp software, and how D-Link's client utility makes mapping the network drive to a My Computer a snap.

Our 2GB test folder transferred in 5:54 (45.2Mbps). A 500MB folder copied over the wireless connection (100% strength, 10-foot drive-to-router distance) in 7:01, or 9.5Mbps, which is good for 802.11g nonturbo performance. The G600 is a bit spendy, but D-Link makes sure you get what you pay for. ▲

DSM-G600
$310 • D-Link • www.dlink.com
●●●●



CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

Maxtor Shared Storage

configuration, but there may be other feature differences as well."

The Pre-N equipment on the market now carries most of the performance advantages of MIMO and 802.11n but without an official standard to back it up. Forward upgradeability and compatibility with 802.11n is dubious at best right now, although Linksys has indicated that it's future draft-N or Pre-N products would be 802.11n upgradeable.

In the end, 802.11n only catches up to Fast Ethernet. So what's next? A leading bet is the WIGWAM (Wireless Gigabit With Advanced Multimedia) effort. Based largely in Germany and backed by Nokia, Philips, Siemens, and others, WIGWAM uses several radio bands and MIMO in pursuit of 1Gbps wireless by 2008. At MIT researchers are working on another 1GHz project called WiGLAN (Wireless Gigabit Local Area Network) focused on the 5.8GHz band. Additionally, a team at the University of Essex last year demonstrated a 10.4Gbps wireless test successfully spanning roughly from the 2 to 7GHz bands.

Storage & Serving

The Maxtor Shared Storage drive helped home LAN users take a big step forward by bringing NAS (network-attached storage) technology out of the business sector and down to the consumer level. With a tiny Linux distro onboard, the Shared Storage sits on the network and acts as a storage and backup target. For anyone averse to the security risks and power waste of leaving a LAN server on 24/7, the Shared Storage was a brilliant advance over directly attached USB and FireWire drives, plus two USB ports allowed for more add-on storage or print server functionality. Western Digital quickly followed with the similar NetCenter drive, several manufacturers jumped in with their own variations, and the consumer NAS movement was off.

Western Digital NetCenter

The smart thing that Maxtor did was to circle around and plant a free firmware upgrade on the Shared Storage that turned it into a media server. Specifically, the drive's Plus version now works as a UPnP AV media server, letting it feed multimedia files to any compliant player device on the LAN without the help of a PC.

Expect to see a lot of NAS/UPnP AV crossover devices arriving in 2006. IDC notes that the consumer network storage market will reach $5 billion by 2008. But perhaps the most innovating thing to hit home LANs of late is Netgear's SC101 Storage Central, a 10/100 two-drive enclosure that looks like a toaster but has inner workings from Zetera. With Zetera's Z-San technology, each drive volume is assigned an IP address and thus has an independent communication line to the network. This has several important ramifications, but the dominant idea is that the enclosure's physical bounds no longer matter. No matter where you put a Z-San enclosure on the network, the management software can stitch the volumes together into one big drive all the way up to 128 petabytes!

Netgear only implements JBOD and RAID-1 mirroring in the SC101, but Zetera's technology just as easily facilitates RAID-5 or some other array type. Better, the IP structure allows for striping performance to be aggregated. One drive might yield 30Mbps, two would cumulatively yield 60Mbps, 10 would be 300Mbps, and so on. The performance bottleneck becomes the limitations of your IP fabric, or network structure. Today, the SC101 doesn't function as a standalone media server, and Netgear is still debating over releasing an AV version or, more likely, tie it to an AV-specific server appliance.

"The directions we want to go don't require a PC to be on," says Netgear's Pathela. "So we're looking at how we can

Netgear SC101 Storage Central

Pre-N For The Impatient

Both the timeline and upgrade path to real 802.11n remain murky. Contemporary 802.11a/g, even in a turbo incarnation, can placate speed buffs for only so long, so we decided to grab a couple Pre-N router and PC Card combos to see how they stacked up.

As a reference point, we used an Asus W1N notebook with Intel 2200AG mini-PCI adapter to download a 500MB folder of small media files and work documents from the LAN's main system via a Netgear WGT634U router. In the same room separated by about 10 feet, the folder transferred in 15:31. One floor down across the house and through several walls, downloading took 17:28.

Belkin Wireless Pre-N Router & Pre-N Notebook Network Card

Almost before anyone had heard of MIMO, Belkin had launched Pre-N products and gambled on a nonstandard wireless implementation. Given that Belkin is predominantly a consumer brand without most of the standards-conformity worries you'll find in businesses, this was a smart move. Typical for Belkin, these Pre-N parts come bundled with an extraordinarily easy installation wizard. The goal here wasn't to prove or disprove Belkin's claims about 800% greater coverage, although we found the beefier antenna array and parallel signaling roughly doubled the performance of our Netgear/Intel 802.11g combo.

Wireless Pre-N Router &
Pre-N Notebook Network Card
$160 (router); $75 (card) • Belkin • www.belkin.com
●●●

Belkin hefted the 500MB folder in the same-room setting in 8:14 but performed the cross-house transfer in 7:44, or 8.62Mbps. That's right. Performance measured faster across the house through multiple walls than from 10 feet away with direct line of sight. The same-room situation yielded four out of five signal strength bars, whereas Windows Zero Configuration showed five bars on the distance test.

The Pre-N Router is skewed toward wireless performance, but there are a few nifty features, such as a SPI/NAT firewall complete with ping blocking and security logging. You also get WPA-PSK and access point functionality. As promised, we could no longer find a single dead spot in the house, so Belkin earns its $100 and $70 street prices and then some.

D-Link DI-634M Wireless 108G MIMO Router & DWL-G650M Super G MIMI Wireless Notebook Adapter

Don't be fooled by the 634M only having two antennas. The unit has four—two visible vertical antennas and two internal horizontal ones—and they do a bang-up job. The 500MB same-room transfer came in at 7:32. The cross-house test hit 6:11—roughly 25% faster than Belkin's implementation. The Airgo chip inside Belkin's products may have been first to market, but the Atheros inside of D-Link clearly used the additional development time to its advantage.

DI-634M Wireless 108G MIMO Router &
DWL-G650M Super G MIMI Wireless Notebook Adapter
$105.99 (router); $89.99 (notebook adapter) • D-Link • www.dlink.com
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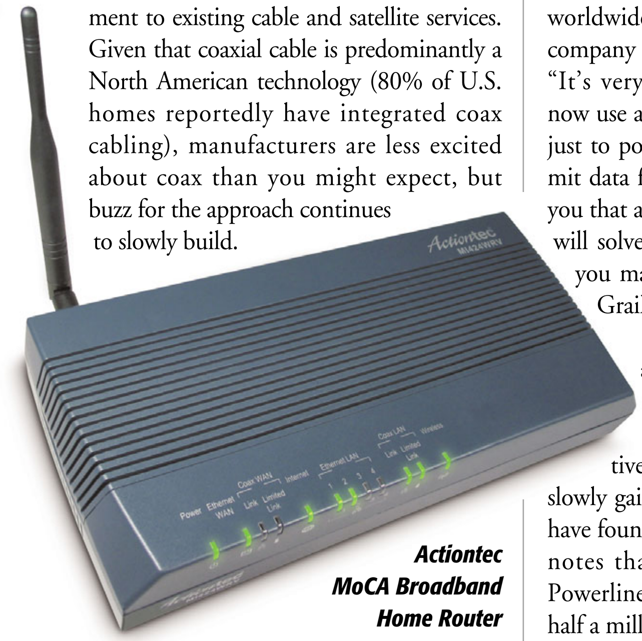
As expected, D-Link's consumer-friendly install software made quick work of getting the router and NIC into full swing, including WPA setup with WinXP SP2's Windows Connect Now tool. (Note that the 634M now offers the AES cipher in addition to TKIP.) Normally, we lean toward routers with 802.11a options for times when video streaming matters, but the 634M's integrated QoS features enabled full-screen streaming of 1,080 resolution WMV HD files with no visible frame loss. The built-in packet prioritization engine accessible through the router's menus offers a very scaled-down form of the GameFuel engine in D-Link's gaming router keyed to a relative handful of specific apps. In theory, the Gigabit gaming router with MIMO would be invincible, but given D-Link's history of adherence to standards (going Pre-N was the result of peer pressure on the company, not preference), waiting for a true 802.11n Gigabit router seems just as likely. Until then, the aggressively priced D-Link MIMO looks very persuasive. ▲

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

employ UPnP AV both in Storage Central and as a separate device. The experience is about putting all kinds of content over the home network. So the menu on your TV might have an option to let you look at what's going on in the baby's bedroom via the IP camera in that room. We're pursuing a home portal concept that can access a variety of resources."

Coax? Powerline? Seriously?

Just when you thought the networking scene had simplified down to Ethernet and some variant of 802.11, prepare for a couple of curve balls. First is coax, as in the cable lines already running through your walls for TV service. In essence, coax replaces your RJ-45 Ethernet, giving you the benefits of high-speed structured wiring without the expensive retrofit and impairment to existing cable and satellite services. Given that coaxial cable is predominantly a North American technology (80% of U.S. homes reportedly have integrated coax cabling), manufacturers are less excited about coax than you might expect, but buzz for the approach continues to slowly build.



Actiontec MoCA Broadband Home Router

Two companies are fueling the coax movement: Coaxsys and Entropic Communications. Coaxsys is primarily in the IPTV business and has several products geared at service providers for IPTV distribution. The TVnet/C Pro product ties into any coax jack in the home and acts as a 100Mbps Ethernet adapter. You can have up to nine TVnet adapters per network, all of which can work with splitters with a maximum distance of 300 feet between adapters. A master adapter distributes data streams to all the other adapters. Coaxsys states that throughput reaches 95Mbps from master to target and 76Mbps from target to target. MSRP is $199 per adapter.

Entropic makes the chips that MoCA now backs. Rated at 270Mbps, actual field tests show real throughput hovering over 100Mbps, integrated QoS, and contemporary packet-level encryption. Backing MoCA are Cisco, Comcast, EchoStar, Motorola, and Panasonic, plus products such as Actiontec's MoCA/Fast Ethernet/802.11g Broadband Home Router, which was sampling at press time but not yet available or priced. Both coax technologies stand ready to accommodate data, video, and voice applications. However, the old HomePlug powerline technology, left for dead by most of the universe, appears to be making a comeback.

"Powerline is increasingly accepted worldwide," says Pathela of Netgear, one company now offering powerline products. "It's very encouraging because you can now use any power outlet in the home not just to power the device but also to transmit data for Ethernet networking. I assure you that a wall-mounted powerline adapter will solve any wireless dead-spot problem you may have. This has been the Holy Grail solution for dead spots."

Today's HomePlug 1.0 spec advertises a 14Mbps data rate, but real performance averages around 5Mbps. Despite the relatively pokey speeds, HomePlug has slowly gained popularity among users who have found problems with wireless. Pathela notes that Netgear sells over 100,000 Powerline products per quarter and over half a million in the last two years.

Most intriguing is Netgear's XE104 (about $85). This HomePlug wall wart uses turbo extensions to boast an 85Mbps theoretical throughput but, more importantly, provides four 10/100 Ethernet jacks. (Obviously, you don't get 4 x 100Mbps bandwidth from an 85Mbps switch.) With this, you don't even need a LAN drop at your home theater. Simply plug your HTPC, game console, Slingbox, DMA, etc. into the switch. Bandwidth constraints aside, this is a LAN retrofitter's dream. Hopefully, even higher-performance versions of this powerline switch will emerge when the HomePlug AV spec goes into production, hopefully before mid-2006. HomePlug AV states a 200Mbps service with 100Mbps+ actual throughput, plus advanced QoS support.

Netgear XE104

Look for HomePlug devices to continue to diversify. Already, some companies offer HomePlug access points, letting you drop wireless coverage at an outlet right next to a home or business' worst reception points. We wouldn't be surprised if some devices integrated HomePlug compatibility right into their enclosures. Imagine a set-top DMA that could draw power and a LAN connection from one outlet. The official stance is that HomePlug still isn't compatible with power strips, but the unofficial word is that if the outlet is nonfiltered it will probably work.

Going Forward

With so much going on in the home networking space, it's no surprise there's rampant chaos and indecision among manufacturers as to how to best take advantage of the media network trend. Wired or wireless? Within each medium, which technology do you adopt, and which specification do you adhere to—if you adhere to one at all? Which devices belong on the LAN and how should they best be integrated? Nobody knows for sure.

"You're seeing companies like HP and Sony put network connections in their TVs," says ABI's Wolf, "but in terms of setting up a widely distributed system that does wireless HD, you're not getting any leadership on that. There's no obvious direction. The true test is when a service provider jumps into the market. That's when you know it's ready for prime time. “

We hate to be reckless, but if you're ready to get on the media network bandwagon, pick an approach and go for it. Don't be so cheap that you build in short-term performance ceilings, but don't go hog wild and run fiber to every room. Think about the apps you want and pick the pieces you need to best support them. A few hundred bucks and a few hours of setup may just have you ready for next-gen multimedia adventures for years to come. ▲

by William Van Winkle

DMAs & Media Extenders

In the DMA (digital media adapter) world, we didn't want to focus on Media Center Extenders per se for a couple of reasons. For starters, Linksys and HP are the only two companies selling bona fide MCE Extenders, and now that the Xbox 360 itself is an MCE extender, there isn't as much need for standalone units. After all, the Linksys WMCE54AG still carries a street price of around $250, while an Xbox 360 Core System lists at $299 (if you can find one). Obviously, even if you're a PS3 fan who can only find one or two things to like about the Xbox, you'd be mentally suspect to buy a standalone extender for a wired connection. Wireless is another story.

There's plenty of innovation in the DMA world. D-Link continues to refine its set-top design, but from Creative to Philips to Roku to Sonos, there's an explosion of designs and interface styles all designed to help pipe multimedia from your PC(s) into your home theater. We checked out a couple to get a feel for the territory.

D-Link DSM-520 Wireless HD Media Player

When the DSM-320 arrived in 2004, it was rough around the corners but showed promise. In 2006 we expected more polish from D-Link's first major revision, the 802.11b/g-enabled DSM-520, but this sophomore effort is still respectable. The big news here is support for HD video and Janus-compliant Windows Media audio. With this you can play Radio@AOL, Napster, Rhapsody, and others. Unfortunately, as Napster subscribers we discovered that Napster is the only one of the supported services that D-Link doesn't support for radio station streaming. No one knows why. But the 520 will play Napster tracks in shared folders.

DSM-520 Wireless HD Media Player

$249.99 • D-Link • www.dlink.com

●●●◖

We're still underwhelmed by D-Link's client software, and the set-top's UI is fraught with annoyances, such as a clock-style loading indicator that sits over subjects' faces when loading pictures and overdone use of file/folder name truncation. There are no tutorials for newbies, and as with the DSM-320, we still couldn't display supposedly supported TIFFs.

For HD users D-Link offers component and HDMI output but not DVI. We had to spend $30 at Radio Shack for a HDMI-to-DVI adapter to see that, yes, in fact 1,080 resolution WMV HD looks damn good on a 50-inch plasma, although we were disturbed to see occasional HD frame drops even over its 10/100 LAN connection. Sound quality is better than the 320, and (psst! don't tell anyone) you may just find that the 520 will play your unprotected DivX 5 files. The 520 is a UPnP AV server and sports a USB port for both direct-attach storage and Windows Connect Now setup. Our problems with the 520, save for the absence of DVI and MIMO, are largely detail-oriented. Overall, it's a worthy Band-Aid until direct PC-to-TV solutions become more common.

Linksys Media Extender WMCE54AG

As an enthusiast you surely have a home brimming with 2.4GHz traffic. A moment of fuzz on a cordless phone call isn't going to bother anybody, but audio hiccups and dropped frames will drive you to distraction over time. This is why Linksys insisted on sending us its 802.11a-enabled router along with the Extender. The set-top has a 10/100 port, but it's really meant to be used as an 802.11g or 802.11a client. At 100 feet through multiple walls, it delivered excellent SD video results via 802.11a and decent results with 802.11g, provided our Uniden cordless phones weren't in nearby use.

Media Extender WMCE54AG

$299 • Linksys • www.linksys.com

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The beauty of MCE extenders in general is the interface. Yes, you sacrifice a lot in broad format support. Forget DivX, OGG, or much anything else beyond Windows Media and universal formats such as MP3 and JPEG. Of course, the one thing an Extender can do that most DMAs can't is record. Lest we veer off into a discussion of the advantages in MCE 2005, suffice it to say that you have component and optical SPDIF outputs on top of the usual lower-end ports, the Extender works with PlaysForSure subscription services, and it also acts as an MSN Messenger conduit. With the Xbox 360 out, the need for Extenders is much reduced, but this still may be a good choice for dens or bedrooms. ▲

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

Top 10 Bluetooth Gadgets

At last, Bluetooth is for real and not just some tottering technology only found in cell phones. If you're still building up your Bluetooth arsenal, consider these top 10 personal area network suggestions.

1. **HP iPAQ hw6515:** We use an Audiovox SMT5600 smartphone, but to do it all again, we'd spring for this convergence gem ($500 with service contract). Thumb board, 1.3MP camera, full-blown Windows Mobile PDA, SDIO slot, and Bluetooth all add up to the apex of power you can put in one pocket.
2. **Stowaway Bluetooth:** When you're on the road, sometimes you want to write more text than an IM or a reminder. This folding Bluetooth keyboard ($150) gives you full-size productivity in a fraction of the space.
3. **Motorola/Oakley RAZRWIRE:** Take a passable Motorola Bluetooth headset, make a proprietary way to mount it on a set of Oakley Hatchet sunglasses, and you've got the RAZRWIRE ($295), available in three colors.
4. **TomTom GO 700:** The GO 300 is the best in-car navigation device we've ever used. The 700 ($900) uses Bluetooth to tap your phone and become a speakerphone, plus provide optional services such as weather and traffic conditions.
5. **Jabra SP500:** The SP500 ($100) is a bit smaller than your hand but offers the best noise-canceling we've experienced with a wireless speakerphone. Suction it to your windshield or plant it on your desk. The SP500 is a must-have for hands-free fanatics.
6. **Plantronics Discovery 640 Bluetooth Headset:** Unbelievably compact, the 640 ($150) is rated for up to 15 hours of talk time with the included AAA battery-based pocket charger. Sleek, yet delivering outstanding audio quality, the 640 sets a new bar in headsets.
7. **Logitech diNovo:** It's not a gamer's first choice, but for everyday use and absolute coolness, no cordless desktop beats the diNovo ($250). The Bluetooth hub is built into the MX900 mouse's charging cradle, the keyboard is super comfortable, and the extra stuff you can do with the detached numeric keypad's display will wow your friends for days. OK, hours.
8. **Bluetake i-PHONO mini:** If you have all your Bluetooth device profiles in order, the i-PHONO mini ($159) can play stereo music from any A2DP-compliant device. If your player doesn't support that, an optional Bluetooth analog audio-to-Bluetooth adapter from Bluetake will solve the problem. A built-in mic on the right earpiece also lets you use the mini as a headset for anything from your cell phone to Skype. Cool!
9. **Epson PictureMate Compact Personal Photo Lab:** Epson inkjet photo quality is legendary, and with this PictureMate ($250), you can take your 4- x 6-inch glossy printing on the road and output straight from any compatible Bluetooth device, such as a notebook or cell phone. The consumables aren't cheap, but the convenience is killer.
10. **Nokia Digital Pen SU-1B:** Need to send someone a quick diagram? Scribble it with the SU-1B ($249). The pen's memory stores a digitized version of your artwork, and you just send it through your Bluetooth phone as an MMS.

HP iPAQ hw6515

Stowaway Bluetooth

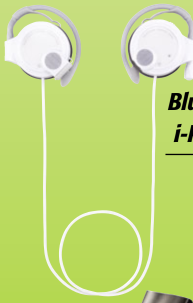
Motorola/Oakley RAZRWIRE

TomTom GO 700

Plantronics Discovery 640 Bluetooth Headset

Jabra SP500

Logitech diNovo



Bluetake i-PHONO mini

Epson PictureMate Compact Personal Photo Lab

Nokia Digital Pen SU-1B

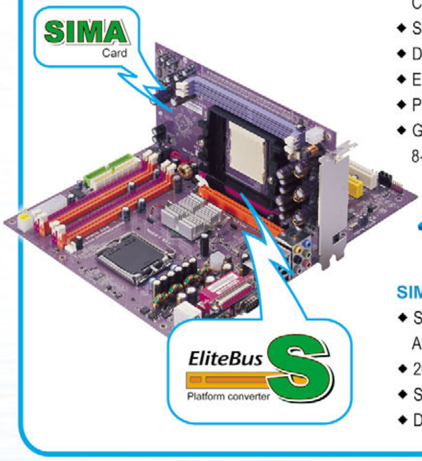
ECS ELITEGROUP

KN1SLI EXTREME

- Socket 939, AMD® Athlon™ 64/Athlon™ 64 FX / Athlon™ 64 X2 Dual-Core CPU
- NVIDIA nFORCE™4 CK8-04 SLI Single Chip
- Dual-Channel DDR(DDR 400/333/266)
- PCI Express x16 and PCI Express x1
- Dual LAN, IEEE 1394A, Serial ATA, 8-Channel Audio

AMD 64 Athlon X2 · AMD 64 Athlon FX · NVIDIA nFORCE4 SLI · Dual Core

PF88



- Socket LGA775 Intel® Pentium® 4 / Celeron® CPU
- SiS® 656 & 965 Chipset
- Dual Channel DDR 2
- Elite Bus slot
- PCI Express x16 and x1
- Giga LAN, IEEE 1394a, Serial ATA, 8-Channel Audio

Dual Core · IOC Instant Overclocking Controller

SIMA A9S Card

- Socket 939 AMD® Athlon™ 64/ Athlon™ 64 FX CPU
- 2000/1600/1200/800/400 MT/s
- SiS® 756 Chipset
- Dual-channel DDR

PF5 Extreme

Intel® · Intel 945P EXPRESS CHIPSET · Dual Core · ECSonic II Overclocking Utility

PF5 EXTREME

- Socket LGA775 Intel® Pentium® 4 / Pentium® D CPU
- Intel® 945P & ICH7R Chipset
- Dual-Channel DDR2 support, DDR2 667/533/400
- PCI Express x16 and PCI Express x1
- Realtek ALC880 8-channel Audio CODEC
- Dual LAN, IEEE1394a, Serial ATA

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diy networking projects

Separating Power User From Pedestrian

by Chris Angelini

Learning about the latest PC technology is exciting in the same way auto enthusiasts enjoy reading about Europe's finest models. But when it comes right down to it, quarter-million dollar exotics and 512MB GeForce 7800 GTXs are only accessible to a privileged few. If you're truly looking to have good, old-fashioned power user fun, break out the wrenches and spend some time under your own proverbial hood instead of lusting over insanely priced hardware.

The following projects are fun, do-it-yourself-type tasks intended to make your network more functional and at the same time satiate your inner-geek. Some can get technically involved. Others cost a bit of money. They all rank high on the coolness scale, though. Each step of the way we'll break down basic costs and the components you'll need. Should you wind up with questions as you embark on your own projects, feel free to visit the online forums at www.cpumag.com and pitch us your best curveball. We'll be keeping an eye out. ▲

Project: Host Your Own Exchange Email Server

Difficulty Rating: ●●●●◖

Cost: ●●●◖

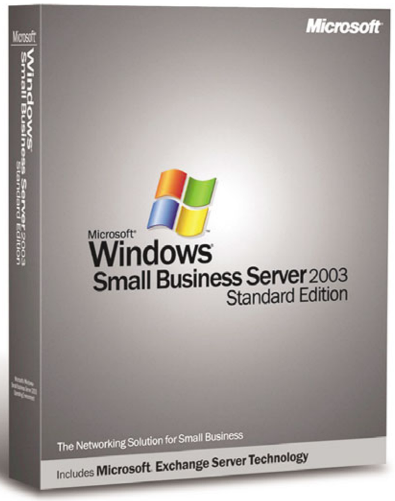
According to The Radicati Group, worldwide email traffic in 2005 was pegged at 141 billion messages per day. By 2009 that number is expected to hit 302.5 million messages per day. Clearly, email is a firmly entrenched pillar of modern communication. And yet, it's one of those technologies that most folks take for granted. You just open Microsoft Outlook or Novell Evolution and watch the text pour in.

If email is one of those technologies that "just works" and is free when you sign up with a new ISP, why bother trying to host a messaging server? After all, nobody ever suggests running your own power station or water treatment plant just in case the basic utilities break down. Well, it turns out that the most popular reason for DIY hosting is control. An in-house email server makes it easy to communicate from your own registered domain, set up addresses for friends, and even deliver email to your smartphone. (How's that for killer functionality?) But surely such an endeavor requires lots of powerful hardware, expensive software, and technical expertise, right? Actually, it really doesn't.

By itself, Microsoft Exchange Server 2003, one of the most popular messaging apps out there, runs a pricey $699. Add that to Windows Server 2003 Standard Edition's $999 tag, and the whole email idea does start looking pretty ugly. Fortunately, Microsoft has an eye out for the little guy. Windows Small Business Server 2003 comes with Windows Server 2003 and Exchange Server 2003 at a price point just above $500.

So, while this project will still have you spending money on software, the WinSBS 2003 package is much more palatable than the expensive email programs that most big businesses have to buy. Better, the hardware requirements on SBS are completely lax; almost any old box will run Windows Server and Exchange fairly well, so long as it has a 1GHz-plus processor, 512MB of memory, and at least 1GB free space.

Now, let's say you own the requisite hardware and have acquired the software.


Microsoft
Microsoft Windows Small Business Server 2003 Standard Edition
The Networking Solution for Small Business
Includes Microsoft Exchange Server Technology

A potent server package. Small Business Server 2003 comes with everything a power user needs to set up email hosting.

CPU RANKING: ○ 0 = EASY/FREE | ●●◖ 2.5 = HARDER/PRICEY | ●●●●● 5 = VERY HARD/EXPENSIVE

You need to fulfill a couple more requirements before pushing forward. First, it's imperative that you have a stable, always-on Internet connection. Downtime can translate into failed delivery. In other words, email can't get to your server if you're on and off with dial-up. Next up is a registered domain name, a .com or .net that friends and associates will use to send email. Finally, you need a public IP address, either static or dynamic. Read on; it'll all make sense soon enough.

Step By Step

You're probably looking at a pile of hardware and a pile of software, wondering when the email magic starts happening. First things first; if the hardware isn't yet a functional PC, make it so, No. 1. Set the BIOS to boot from a CD and get ready to load WinSBS 2003.

The installation's opening screens are very similar to what you'd see in Windows XP, so in the name of brevity, make sure your disk controller drivers are installed using F6 if they're newer than the OS, create two partitions on the hard disk (make it easy and split the drive in half), and format using Microsoft's NTFS file system. Once all the install files are copied, the server will restart, and you'll be greeted by the graphical setup element. Piece of cake.

Continue on as the routine detects devices, copies more files, and asks for a bit of personal information. From here out everything is automated. Go grab a Rockstar. When you get back, you'll see the Windows Desktop and a wizard that will guide you through what's left of the WinSBS 2003 installation. It'll check your system for configuration requirements, coax more info from you (such as the box's full DNS [Domain Name System] name and installation paths), and help get networking adapters set up properly. An in-depth Windows configuration will then commence, burning through all four CDs included with SBS and 30 minutes of your time. The wait is worthwhile, though. When setup concludes you'll have a fully operational Windows Server 2003 machine with Exchange Server installed according to the settings you specified.

After the system reboots and you really log on for the first time, a ToDo list pops up begging for attention. Hit each step in order and add a Step 2.5: Check Windows Update. Microsoft has been busy keeping WinSBS up-to-date with service packs and security patches; you'll want every last one.

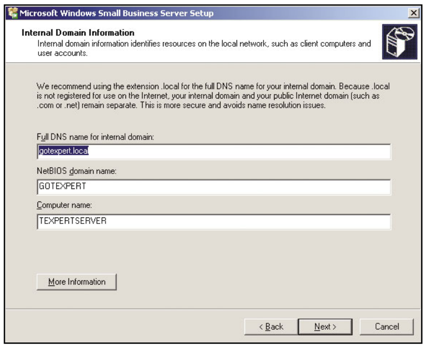
Email Discussions

So now you're up and running, locally at least. But it's not quite time to start sending and receiving email just yet. When you ran Step 2 of the ToDo list (Connect To The Internet), you were asked to configure your network adapters, choose accessible services, and enter an email domain name. Those were the fields that helped define how your server will handle messaging from here on out.

The domain, for example, is the easy-to-remember name folks will use when sending email. It'll map to an IP address through DNS. Because all that happens using external name servers, you'll need to do a little leg work before Internet email functions properly. If you have a static IP address, you'll need to contact your ISP and have it add an MX (mail exchange) record, which basically points to your mail server. The inclusion of an A record will then link said mail server to a public IP address (as opposed to an internal address, such as 192.168.0.1).

With the external pieces in place, trace the path of an email from a friend, say in New York, to your office in Los Angeles. The message is first sent from the friend's workstation to an outgoing mail server, say in his corporate headquarters. That server uses DNS to retrieve the mail server address corresponding to your domain name. In other words, domain information is used to locate the Exchange Server sitting right there next to you on the West Coast. The MX record on file at your ISP directs the message to *mail.yourserver.com* or whatever hostname you've chosen. The A record then translates to an exact IP address, of which there is only one in the world.

Now, things get a little more complicated for cable and DSL subscribers with


Microsoft Windows Small Business Server Setup

Internal Domain Information

Internal domain information identifies resources on the local network, such as client computers and user accounts.

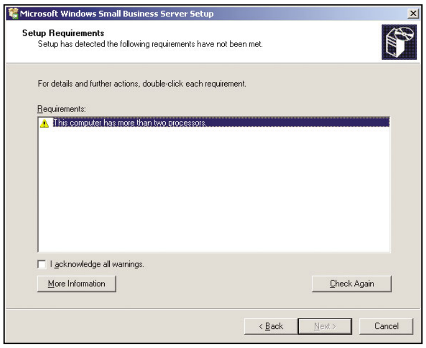
We recommend using the extension .local for the full DNS name for your internal domain. Because .local is not registered for use on the Internet, your internal domain and your public Internet domain (such as .com or .net) remain separate. This is more secure and avoids name resolution issues.

Full DNS name for internal domain: gotexpert.local

NetBIOS domain name: GOTEXPERT

Computer name: TEXPERTSERVER

Make a decision. Early in the Windows SBS 2003 setup, you're asked to decide an internal domain name and computer name. Call the ball here and stick with it; you don't want to change settings later.


Microsoft Windows Small Business Server Setup

Setup Requirements

Setup has detected the following requirements have not been met.

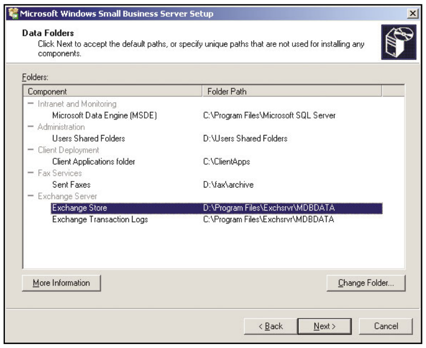
For details and further actions, double-click each requirement.

Requirements:

This computer has more than two processors.

☐ I acknowledge all warnings.

It has your back. If you are worried that your hardware configuration isn't up to snuff, you don't need to be. Windows SBS 2003 will check your setup before proceeding through its installation routine.


Microsoft Windows Small Business Server Setup

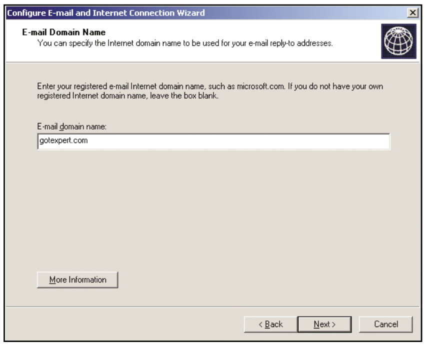
Data Folders

Click Next to accept the default paths, or specify unique paths that are not used for installing any components.

Folders:

Component	Folder Path
− Intranet and Monitoring	
Microsoft Data Engine (MSDE)	C:\Program Files\Microsoft SQL Server
− Administration	
Users Shared Folders	D:\Users Shared Folders
− Client Deployment	
Client Applications folder	C:\ClientApps
− Fax Services	
Sent Faxes	D:\fax\archive
− Exchange Server	
Exchange Store	D:\Program Files\Exchsrvr\MDBDATA
Exchange Transaction Logs	C:\Program Files\Exchsrvr\MDBDATA

A little performance trick. According to Microsoft's TechNet documents, you will get better performance by separating the Exchange store and transaction log files onto separate volumes.



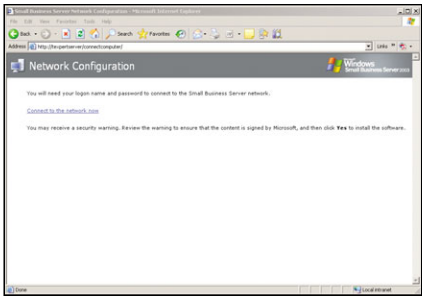
E-mail Domain Name

You can specify the Internet domain name to be used for your e-mail reply-to addresses.

Enter your registered e-mail Internet domain name, such as microsoft.com. If you do not have your own registered Internet domain name, leave the box blank.

E-mail domain name: gotexpert.com

Email setup. The Configure E-mail And Internet Connection Wizard help gets Exchange up and running by collecting your domain name and network information.



Small Business Server Network Configuration - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Links
Network Configuration
Windows Small Business Server 2003
Done
Local intranet

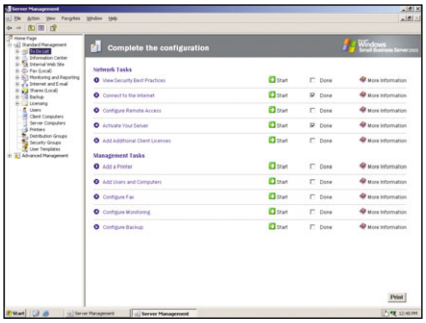
Address: http://texpertserver/connectcomputer/

You will need your logon name and password to connect to the Small Business Server network.

Connect to the network now

You may receive a security warning. Review the warning to ensure that the content is signed by Microsoft, and then click **Yes** to install the software.

Simple client configuration. Connecting to your new server with a Windows XP Professional workstation is a piece of cake thanks to a little help from the Network Configuration Wizard.



Network Tasks

- View Security Best Practices — Start ☐ Done — More Information
- Connect to the Internet — Start ☑ Done — More Information
- Configure Remote Access — Start ☐ Done — More Information
- Activate Your Server — Start ☑ Done — More Information
- Add Additional Client Licenses — Start ☐ Done — More Information

Management Tasks

- Add a Printer — Start ☐ Done — More Information
- Add Users and Computers — Start ☐ Done — More Information
- Configure Fax — Start ☐ Done — More Information
- Configure Monitoring — Start ☐ Done — More Information
- Configure Backup — Start ☐ Done — More Information

What ToDo. After you log in for the first time on your Windows Server 2003 machine, you will see this ToDo list, which will help to complete your server configuration

dynamic IPs. Because the address changes every so often, you can't exactly create a permanent DNS record. Instead, dynamic DNS services, such as Tzolkin (www.tzo.com) and Dynamic Network Services (www.dyndns.com), will monitor your address and update the DNS record should anything change. At least for power users on a budget, dynamic DNS is much more affordable than a static line.

There's a last issue you'll need to consider before wrapping up your Win2003 box. Even if email is properly formatted and routed to a viable mail server, it has to break past your defenses before it can be delivered. You might not be rejecting mail intentionally, but if your router is blocking incoming ports, you'll want to open one for email to get through. Generally, you'll do that through the router's control panel. SMTP employs TCP port 25, so you'll want to get in there and forward all incoming traffic on that port to your WinSBS machine.

Send & Receive

You've laid the foundation externally, and your server is cocked, locked, and ready to rock. But you won't be checking for messages on the server itself. Rather, you'll need to set up a workstation and connect it to the newly created domain.

Fortunately, WinSBS 2003 takes a massive step forward in the field of client connectivity. Notice that the second step under Management Tasks in the ToDo list is Add Users And Computers. Running that wizard on the server gives you the option of defining a user according to several different templates. Assuming you'd like to administer your own network, select the corresponding permissions and move on. The next screens establish your login info, client applications, and an actual device name for your workstation.

Here's the fun part. Physically attach your computer to the LAN, launch IE, and type the following: **http://*yourservername*/connectcomputer** in the address field, where *yourservername* is the actual name of your server machine. Run through the connection process to authenticate yourself, assign users to the machine, and migrate your old profile to WinSBS' new domain. You'll see applications being installed, and your workstation will restart a last time. The next time you log in, you'll be a bona fide network client.

Of course, the true test is firing up Outlook and sending some test mail. Next, have a friend shoot you a message from an external address. If they both get to where they were going, congratulations, you're hosting your own email. If they don't, get ready for some hairy troubleshooting. Check out Harry Brelsford's "Advanced Windows Small Business Server 2003 Best Practices" for guidance on such topics as ISP port blocking.

Hopefully everything has gone according to plan up to this point. If it has and you're still feeling adventurous, consider playing with Microsoft's bundled POP3 connector, which lets you map email from POP3 boxes (surely you have several) to your Exchange server. Another feature of WinSBS that makes the whole ordeal worthwhile is Outlook Mobile Access. You can connect to Exchange using a Web-enabled phone or Pocket PC device and read/compose email, view your calendar, retrieve contacts, and manage tasks. You don't get the BlackBerry-like experience, but a Windows Mobile 5.0 Messaging and Security Feature Pack is expected early in 2006 that'll enable Direct Push Technology, creating an even more exciting reason to roll out your own email box. ▲

The Tally

You probably own a lot of what's involved in building an Exchange server. Hopefully, an older system won't cost you anything. The software can get pricey, though. Microsoft's Windows Small Business Server 2003 package is the most cost-effective solution at roughly $500 online. Securing a domain name will cost roughly $7. Dynamic DNS service for a custom domain runs approximately $25 per year. You likely already own a router, but if you're looking to get email delivered to a smartphone, expect to pay $150 or more for a decent model. ▲

Project: Set Up An FTP Server

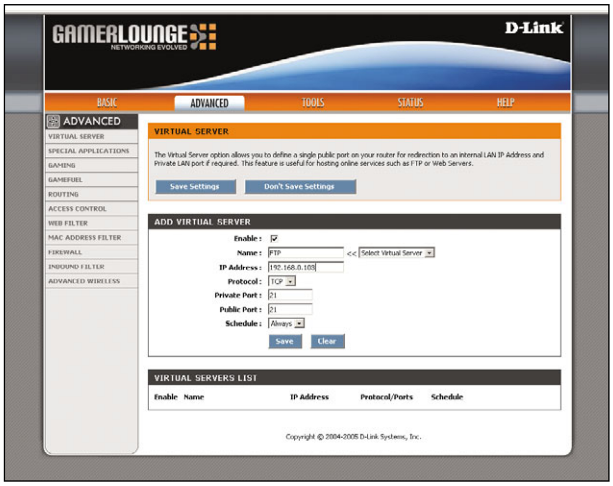
Difficulty Rating:
● ◖
Cost:
● ◖

If you were able to set up an Exchange server (or you at least read through the steps) without batting an eye, configuring an FTP server should be a walk in the park. If you instead found your eyes glazing over, this is a much easier place to start a networking career. FTP servers are just as useful as email boxes, after all, and there are plenty of situations where it'd be nice to have a repository for accessing important files on the road.

You can approach this project from a couple of different directions. The quick-and-easy method would be to leverage WinXP Professional's built-in FTP server. Though functional, it isn't the most feature-filled option out there. There are more advanced third-party solutions that won't cost you anything. Or you could spend some money and pick up professional-grade server software if you need encryption and other advanced capabilities.

Of course, the WinXP route is easiest, even if it does require a bit of manual installation work. Open Control Panel and click Add Or Remove Programs. Click Add/Remove Windows Components. Scroll down to Internet Information Services, select it, and click the Details button. Next, check the Common Files, File Transfer Protocol, and Internet Information Services Snap-In boxes. If you're prompted to, insert the WinXP installation CD.

In Control Panel, double-click Administrative Tools and then Internet Information Services. Expand the FTP Sites tree in the left-hand pane, and you will see an object corresponding to your new site called Default FTP Site. Right-click it and select Properties. A dialog box with four tabs should immediately pop up. This is where you will tweak the site's many options.



The Virtual Server option allows you to define a single public port on your router for redirection to an internal LAN IP Address and Private LAN port if required. This feature is useful for hosting online services such as FTP or Web Servers.

Enable : ☑
Name : FTP << Select Virtual Server
IP Address : 192.168.0.103
Protocol : TCP
Private Port : 21
Public Port : 21
Schedule : Always

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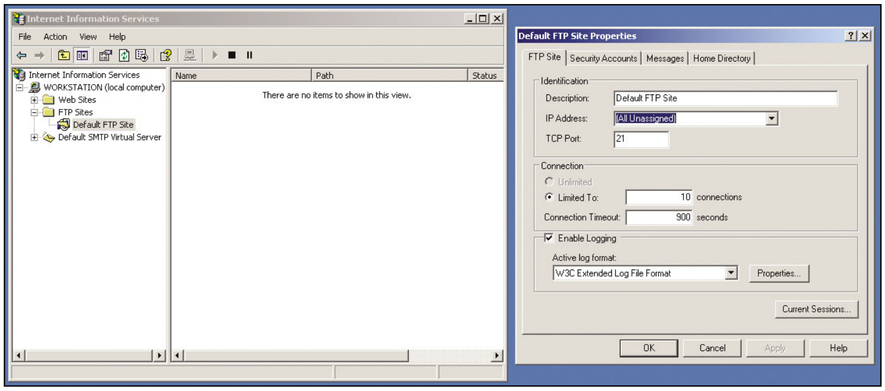
Let 'em through. If you are running a router, you will probably need to set up a virtual server to let FTP traffic through to the corresponding internal address.



There are no items to show in this view.

Description: Default FTP Site
IP Address: (All Unassigned)
TCP Port: 21
○ Unlimited
● Limited To: 10 connections
Connection Timeout: 900 seconds
☑ Enable Logging
Active log format: W3C Extended Log File Format

Windows XP's FTP server. Free and relatively flexible, WinXP's built-in FTP server does the trick for casual administrators.

The first tab lets you change the FTP's description, specify a TCP port other than 21, and change the number of people who can connect concurrently. The Security Accounts tab reveals a dirty little secret: WinXP enables anonymous access to your site by default. Don't worry; curious browsers can only see files you deliberately move into the root directory. In fact, Microsoft actually recommends allowing anonymous access because user accounts are tied to WinXP logins, and any authentication data would be transmitted unencrypted, potentially compromising system security. It's best to leave anonymous access enabled. Just be careful with what you decide to share.

The Third-Party Alternative

An arguably better choice is RhinoSoft's free Serv-U Personal (www.servu.com) application. The basic edition doesn't encrypt login information, either, but it does keep its own user accounts completely separate from WinXP authentication information, so there is less overall risk. Serv-U also enables access to subdirectories, whereas WinXP keeps anonymous users in the root folder. Many of Serv-U's options are similar to what you've already seen. Ultimately, you'll get better features and an extra layer of security when you go with RhinoSoft's solution.

Should you need more security, managed traffic ratios, and directory mapping, you'll have to shell out some dough. Serv-U Professional enables all those features at $199. The flexibility is nice, but unless you're dealing with

CPU RANKING: ○ 0 = EASY/FREE | ● ● ◖ 2.5 = HARDER/PRICEY | ● ● ● ● ● 5 = VERY HARD/EXPENSIVE particularly sensitive information, most power users should be able to get by using the less-expensive options.

A home-brewed FTP suffers one minor inconvenience, though. Nobody wants to memorize the IP address. And if you're on a cable or DSL connection with a dynamic IP, the issue compounds, as your IP changes from time to time. Back to the dynamic DNS idea you go. For a nominal fee, keep a domain name affixed to your IP. It'll be so much easier to remember that way.

There's one last thing: Most home networks sit behind a router/firewall. The router faces nasty Internet traffic and doles out internal network addresses to connected workstations using DHCP. What happens when you're on the beach in Hawaii and try to wirelessly pull some music from your FTP in Michigan using the internal IP address 192.168.0.100? Absolutely nothing. To access a network PC this way you'll need to hit the external address and forward traffic to the workstation running FTP software. Get into your router's configuration utility and set up a virtual server, which will send external traffic to a specified network address on the port of your choosing. ▲

The Tally

Not only are FTP servers easy to set up, but they can also be pretty cheap. In essence, you'll need a workstation and some software. Should you find your needs transcending the free stuff that's available, an advanced server app runs between $30 and $200. Dynamic DNS service costs about $25 a year. The convenience of having an accessible repository online when you need to send or receive large files? Priceless. ▲

Project: Build Your Own Media Server

Difficulty Rating:
●●●
Cost:
●●●●

Hate it or love it, technology is slowly but surely spreading across your house. Perhaps you have a home office desktop. Walk 20 feet to the living room and, voila, another PC plugged into a big-screen TV. Maybe you own one or two laptops now connected wirelessly to your LAN. Personal media players, multimedia cell phones, online game consoles, the list goes on and on. There have even been a handful of Internet-enabled refrigerators to see the light of day.

But why on earth would you really want so many devices scattered around? Think selfishly for a moment. When you get down to it, everyone wants to watch or listen to their favorite media when and where they want. That could be on the road, in the family room, or outside by the pool. Of course, managing an entire family's music, movies, recorded TV programming, and pictures is one of those chores for which nobody volunteers. So just do it right the first time by centralizing on a media server system, accessible all over the house.

The 500GB 'cuda. Media servers beg for copious capacity. A couple of 500GB Barracuda 7200.9 drives should do the trick.

By now you're probably wondering how this media server idea differs from any other PC you've built. At the nuts and bolts level, it really doesn't. Then again, Intel's new Viiv initiative simply takes existing technology and wraps it up into a marketable package suited for multimedia. The idea here is to pick the parts capable of serving tunes and movies most effectively. It'd also be nice if you had the software necessary to convert multimedia file formats, thereby maintaining compatibility with your portable devices.

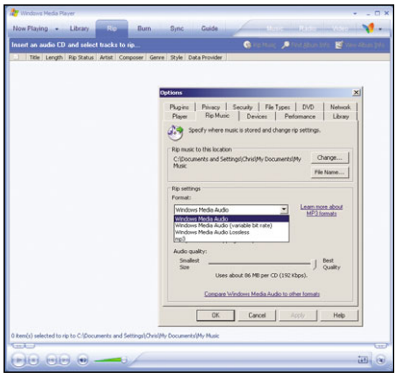
Pick The Parts

A media server doesn't need to be a jack of all trades, but it does need to perform a few functions well. For example, it should be able to contend with serious multitasking as it delivers intensive content. At the same time, you'll want a substantial network connection; 802.11b running at half-speed from the basement probably won't suffice.

Snag a dual-core processor right off the bat. Of course, Intel would have you go Pentium D to comply with its Viiv design and Digital Home vision, but an Athlon 64 X2 will give you performance on par or beyond the Pentium. Pair the chip to a solid platform. Fortunately, you won't be using pricey SLI or CrossFire graphics technology here, so lean on an Intel 945P board or Nvidia nForce4 Ultra-based product.

Most programs still aren't taxing 1GB of memory. Understanding that a media server will be handling gratuitous amounts of data, however, you'd be wise to use a 2GB memory kit early in the game. Graphics should receive even less emphasis. Yes, deploying cards with hardware-based video acceleration will help improve performance, but only during playback. A media server merely transfers data and thus doesn't need extraneous horsepower. Instead, spend some extra cash on storage. Figuring that each DVD you back up nibbles away 4GB at a time, filling a 250GB or 300GB drive won't be difficult at all. Just wait until you start adding TiVo-ed content and music. If you want a media server done the power user way, expect to approach 1TB as you hunt down fabulous hard drive sales online.

CPU RANKING: ○ 0 = EASY/FREE | ●●◖ 2.5 = HARDER/PRICEY | ●●●●● 5 = VERY HARD/EXPENSIVE



Specify where music is stored and change rip settings.

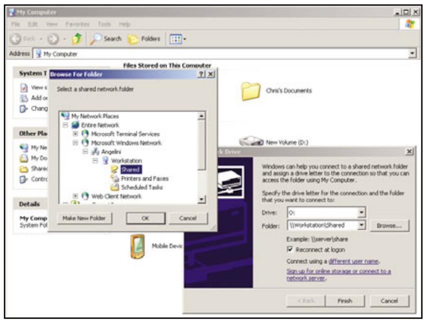
C:\Documents and Settings\Chris\My Documents\My Music

Format: Windows Media Audio

Uses about 86 MB per CD (192 Kbps).

0 item(s) selected to rip to C:\Documents and Settings\Chris\My Documents\My Music

Free CD archival. Can't beat free software, right? Windows Media Player 10 will rip your CD collection into WMA or MP3 format and store it on your media server.



Select a shared network folder

Windows can help you connect to a shared network folder and assign a drive letter to the connection so that you can access the folder using My Computer.

Specify the drive letter for the connection and the folder that you want to connect to:

Drive: O:

Folder: \\Workstation\Shared

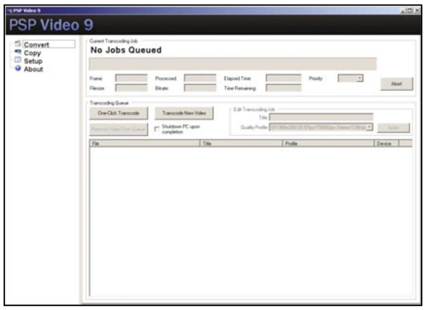
Example: \\server\share

☑ Reconnect at logon

Connect using a different user name.

Sign up for online storage or connect to a network server.

Simplified navigation. Make it easy for network clients to find streaming music by mapping a network drive on each workstation.



No Jobs Queued

Third-party PSP transfers. PSP Video 9 is a free app that identifies a PSP in USB mode and transcodes and transfers various video formats to the PSP folder.

Building the box should be a piece of cake. Connecting it to the network is where you'll want to be careful. The natural inclination might be to go wireless and tuck your hardware out of sight. And while the theoretical 54Mbps that 802.11g enables might actually be enough, distance, obstacles, and radio interference really knock the wind out of a wireless router's sails. Rather, run a wire to the media server to get 100Mbps or 1Gbps of throughput.

Get The Software In Order

WinXP comes with provisions for sharing files across a network that you can use to grant media server access. However, real innovation generally happens at the third-party level. Take SnapStream's Beyond TV Link, for example, which makes it possible to watch television from any of the workstation machines by streaming the feed over your network. Here's how it works: You install Beyond TV on your media server, along with any combination of analog and digital tuners. Then, put Beyond TV Link on your WinXP-based client machines. Each workstation connects to the media server and streams recordings, live television, and program guide information as if it had a tuner installed. The hardware requirements are fairly accommodating. Just remember that every client watching live TV monopolizes a tuner. So if three people want to simultaneously view different shows, the media server needs as many tuner cards.

With the TV taken care of, it's time to spend some time on audio. As luck would have it, an up-to-date copy of WinXP includes all the tools necessary to rip CDs to MP3 or WMA format. Simply fire up Windows Media Player 10 and pop in your first disc. But before clicking the Rip tab, click Tools and then Options to configure quality settings. Select the Rip Music property sheet and choose the output destination. Under Rip settings pick a desired format and quality level. Higher is always better when you have mega-hard drive capacity. Click Apply and then OK to get back into the player.

Now make sure the directory hosting your music collection is shared. Right-click it and click Sharing And Security. Check Share This Folder On The Network and enter a memorable share name. Apply the setting change and click OK. At this point, visit each client workstation, open My Computer, and select Tools and then Map Network Drive. Choose a drive letter for the music repository. Next, browse to the server's music folder. Clicking Finish connects to the network drive and gives you a shortcut under My Computer. Whenever you want to stream music, get to it through that link.

How about entertainment on the go? Many personal players only support a handful of media formats, so it's important to convert incompatible files before sending them off. Take Sony's PSP, for example. Although the handheld plays WMA and MP3 audio files, it's limited to a proprietary MPEG-4 video format. One workaround is to shell out $20 for Sony's Image Converter 2.1 Plus. Or you could take the easy route with PSP Video 9 (www.pspvideo9.com), a freeware program that's can identify your PSP in USB mode; transcode several different video types, including TivoToGo; and transfer them to the proper PSP folder. It's unquestionably a valuable tool. ▲

The Tally

A media server is best served by some beefy hardware, such as a dual-core CPU ($241 to $803), a couple gigs of memory (around $300), and hefty hard drives (around $200 per 400GB drive). Should you also spring for some sweet software, Beyond TV 4 will run $70 and a three-pack of Beyond TV Link licenses will set you back an additional $89. It's a good thing that Windows Media Player and PSP Video 9 are free, eh? ▲

Extra Credit: Build Your Own NAS Box

In *CPU*'s February 2005 issue, we spent time covering the latest trends in storage. One piece, "Serializing Storage" (page 60), contained an in-depth tutorial on rolling out your own compact NAS device. The project is pretty advanced—call it a 4.5 out of 5 on the difficulty meter—but it's also unquestionably one of the coolest DIY endeavors. Take a look if it sounds like something up your alley. ▲

firewall tips & tricks

Protect Against Malicious Users & Lousy Performance

Interesting fact: When hardware vendors design a new processor or graphics card, they don't tune the living daylights out of it. The consequence of shipping a component that teeters on the brink of instability is direr than placing second in a couple of benchmarks.

Networking folks are similar in a way. Though they put far less emphasis on performance, you still hear about reliability, ease of use, and throughput. Yet it'd seem that power users spend far less time tweaking their routers than overclocking CPUs or modding cases. But if you think your networking equipment sprang out of its box ready for pedal-to-the-metal action, think again. Hardware and software is set up with interoperability in mind, many times sacrificing security and speed in favor of a better user experience. So what's a power user to do? Tighten the defenses. Cut the overhead. Optimize your connection. Coffee is for closers. Lag will only get you killed on the virtual battlefield and wreak havoc on your VoIP phone calls.

From The Top

In a presentation she authored last year, Carrie Higbie of The Siemon Company outlined the top 10 ways to optimize network performance. Most points were aimed at large businesses, but there's wisdom in there for home users, too. For instance, the first recommendation is to identify and eliminate bandwidth "bandits." Higbie's examples include improperly terminated cables and poorly situated components. Trouble spots on a home network might start with an overextended wireless network or the wrong cabling between GbE (Gigabit Ethernet) connections.

Tip No. 6 suggests evaluating your bandwidth needs. On a corporate network, these might involve researching 10Gb connectivity or monitoring utilization. At home, instead check network clients for peer-to-peer programs, which can hammer the availability of your Internet throughput and hamper time-sensitive apps such as real-time voice.

Finally, make every effort to secure your network (Higbie's No. 8 tip). Among hackers, spyware, viruses, and pop-ups, even a single-user home network is in harm's way. Yet, wireless routers still come with encryption turned off. Moreover, many casual users continue to run without antivirus protection or a regular backup routine.

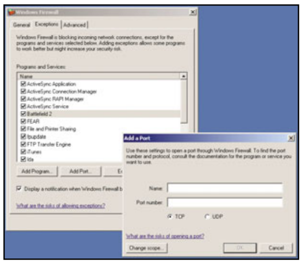
The Microsoft Solution

In an attempt to heighten security awareness and protect mainstream folks from silent attacks, Microsoft bundles an improved software firewall in Windows XP Service Pack 2. The implementation is fairly basic; it addresses defense worries by blocking all incoming packets except for those sent in response to a query. Creating exceptions to that rule is a matter of identifying individual applications or ports that you want the firewall to accept traffic from. Just open Control Panel, double-click Windows Firewall, and select the Exceptions tab. Click either Add Program or Add Port to accept inbound traffic.

Documents from Microsoft's TechNet do concede that running the Windows Firewall can have a negative impact on system performance, especially if you receive a lot of UDP traffic. Microsoft's example is a streaming media server using unicast broadcasts to deliver information. UDP is typically used to create connections between clients and content streams. Each connection must pass through the Windows Firewall, requiring processing overhead.

Tweak The Armor

Nvidia introduced its hardware-based firewall technology alongside the nForce3



Windows Firewall is blocking incoming network connections, except for the programs and services selected below. Adding exceptions allows some programs to work better but might increase your security risk.

Programs and Services:

Name
☑ ActiveSync Application
☑ ActiveSync Connection Manager
☑ ActiveSync RAPI Manager
☑ ActiveSync Service
☑ Battlefield 2
☑ FEAR
☑ File and Printer Sharing
☑ Ipupdate
☑ FTP Transfer Engine
☑ iTunes
☑ Ida

☑ Display a notification when Windows Firewall b

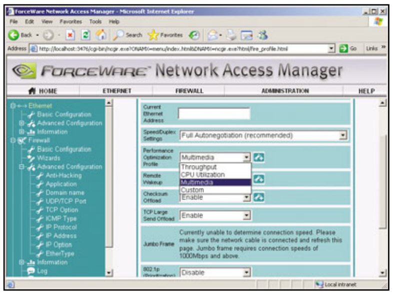
What are the risks of allowing exceptions?

Use these settings to open a port through Windows Firewall. To find the port number and protocol, consult the documentation for the program or service you want to use.

Name:
Port number:
● TCP ○ UDP

What are the risks of opening a port?

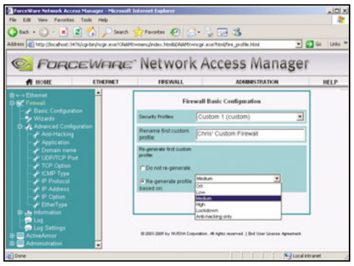
A no-brainer. The Windows Firewall is fairly effective, very easy to use, and flexible enough to customize. It's not necessarily the best performer, though.



Address http://localhost:3476/cgi-bin/ncgir.exe?ONAME=menu/index.html&DNAME=ncgir.exe?html/fire_profile.html

Current Ethernet Address:
Speed/Duplex Settings: Full Autonegotiation (recommended)
Performance Optimization Profile: Multimedia (Throughput, CPU Utilization, Multimedia, Custom)
Remote Wakeup:
Checksum Offload: Enable
TCP Large Send Offload: Enable
Jumbo Frame: Currently unable to determine connection speed. Please make sure the network cable is connected and refresh this page. Jumbo frame requires connection speeds of 1000Mbps and above.
802.1p (Prioritization): Disable

Hit the afterburners. You can eke additional performance from Nvidia's Ethernet interface by tweaking its performance optimization profile.



Address http://localhost:3476/cgi-bin/ncgir.exe?ONAME=menu/index.html&DNAME=ncgir.exe?html/fire_profile.html

Firewall Basic Configuration

Security Profiles: Custom 1 (custom)
Rename first custom profile: Chris' Custom Firewall
Re-generate first custom profile
○ Do not re-generate
● Re-generate profile based on: Medium (Off, Low, Medium, High, Lockdown, Anti-hacking only)

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Easy as it gets. Drop-down menus give you easy access to the Nvidia Firewall setup. Use Custom settings if you want to change any of Nvidia's predefined options.

chipset, and it persists with nForce4 under the moniker ActiveArmor. As opposed to Microsoft's software, ActiveArmor is a chipset-based firewall with specific hardware-accelerated components that circumvent performance issues inherent to the Windows Firewall. ActiveArmor also has a comprehensive suite of security extras.

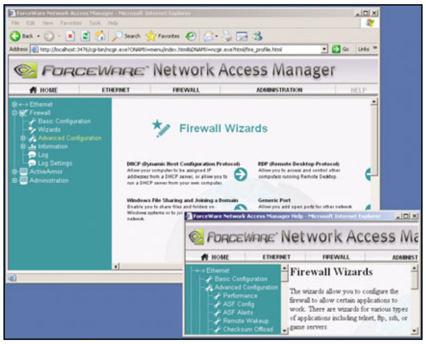
Extra features translate into increased complexity. You'll find a lot more knobs and switches in ActiveArmor's setup than in Windows Firewall. Given nForce4's popularity, it's surprising Nvidia hasn't spent more time drafting a comprehensive configuration guide to help enthusiasts tune ActiveArmor.

Fortunately, getting the firewall installed is a matter of updating to Nvidia's latest platform drivers. When you're asked whether or not to apply the Firewall and ForceWare Network Access Manager, click Yes. Once the next setup routine begins, you have three configuration choices. Stick with the default to leverage ActiveArmor along with Nvidia's anti-hacking features, skipping past the Windows Firewall altogether. Rebooting yields a new shield icon in your System Tray. Double-click it to invoke the Nvidia Firewall Summary, your customization launch pad.

Right away you'll notice a drop-down menu with selectable profiles. There's no real explanation as to the differences among Low, Medium, and High, so click the View The Current Profile link. The menu provides detailed information on each profile. Much better. Still, there are a staggering number of configurable settings at your disposal, all accessible via the window pane on the left. Nvidia splits them into Ethernet, Firewall, ActiveArmor, and Administration.

The most useful options are under the Ethernet tree within the Basic Configuration submenu. Notice the Performance Optimization Profile drop-down. By default, Nvidia recommends optimizing for CPU utilization. However, if you're doing video streaming or VoIP, consider the Multimedia setting to tighten the interrupt interval. At the same time, you can turn on 802.1p (Prioritization) for QoS support.

The Firewall page is where things start getting complicated, especially if you're still operating under a predefined profile.



http://localhost:3476/cgi-bin/ncgi.exe?ONAME=menu/index.html&DNAME=ncgi.exe?html/fire_profile.html

DHCP (Dynamic Host Configuration Protocol)
Allow your computer to be assigned IP addresses from a DHCP server, or allow you to run a DHCP server from your own computer.

RDP (Remote Desktop Protocol)
Allow you to access and control other computers running Remote Desktop.

Windows File Sharing and Joining a Domain
Enable you to share files and folders on Windows systems or to joi

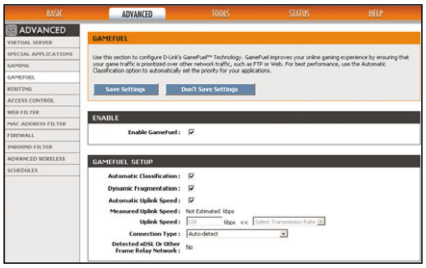
network.

Generic Port
Allow you add open ports for other network

Firewall Wizards

The wizards allow you to configure the firewall to allow certain applications to work. There are wizards for various types of applications including telnet, ftp, ssh, or game servers.

A helping hand. You might argue that the Nvidia Firewall isn't very user-friendly. A handful of wizards and an explanatory help page are perhaps its most redeeming features.



GAMEFUEL

Use this section to configure D-Link's GameFuel™ Technology. GameFuel improves your online gaming experience by ensuring that your game traffic is prioritized over other network traffic, such as FTP or Web. For best performance, use the Automatic Classification option to automatically set the priority for your applications.

ENABLE

Enable GameFuel : ☑

GAMEFUEL SETUP

Automatic Classification : ☑
Dynamic Fragmentation : ☑
Automatic Uplink Speed : ☑
Measured Uplink Speed : Not Estimated kbps
Uplink Speed : 128 kbps << Select Transmission Rate
Connection Type : Auto-detect
Detected xDSL Or Other Frame Relay Network : No

High-performance router. GameFuel is one of those technologies unique to D-Link's DGL-4300, allowing it to prioritize data to speed up time-sensitive apps.

Changing any setting requires a custom profile, which you can set under the Basic Configuration page under Firewall. Pick Custom 1 (custom), rename it to something more fitting, and establish some baseline rules by regenerating one of the other security profiles. The Medium setting is probably most universally sound. Now you'll have access to several wizards and all the options under Advanced Configuration. There are 10 pages of settings in all. They are fairly low-level, but there's a Help button on each page for more info.

Settings for the ActiveArmor engine are comparatively fewer; the feature is enabled by default. The processing overhead tied to incoming and outbound connections is typically offloaded to the nForce4's hardware. You can turn that feature off on a per-application or per-port basis, but use the acceleration whenever possible.

The Hardware Route(r)

When it comes to network security, there really is no such thing as too much protection. That includes redundant firewalls. Hardware and software implementations each have pros and cons, which is why many folks run both. A hardware router sits on the front line of your network and may effectively protect numerous client machines. Software-based routers do a better job of regulating outgoing traffic on individual machines.

A separate hardware device, of course, can also introduce extra functionality. For example, D-Link's DGL-4300 ($150) with GameFuel technology not only offers fantastic firewall capabilities but also comes with wireless networking, GbE switching, and QoS considerations. The DGL-4300 is well-configured out of the box, but you can certainly tweak it to better serve your needs.

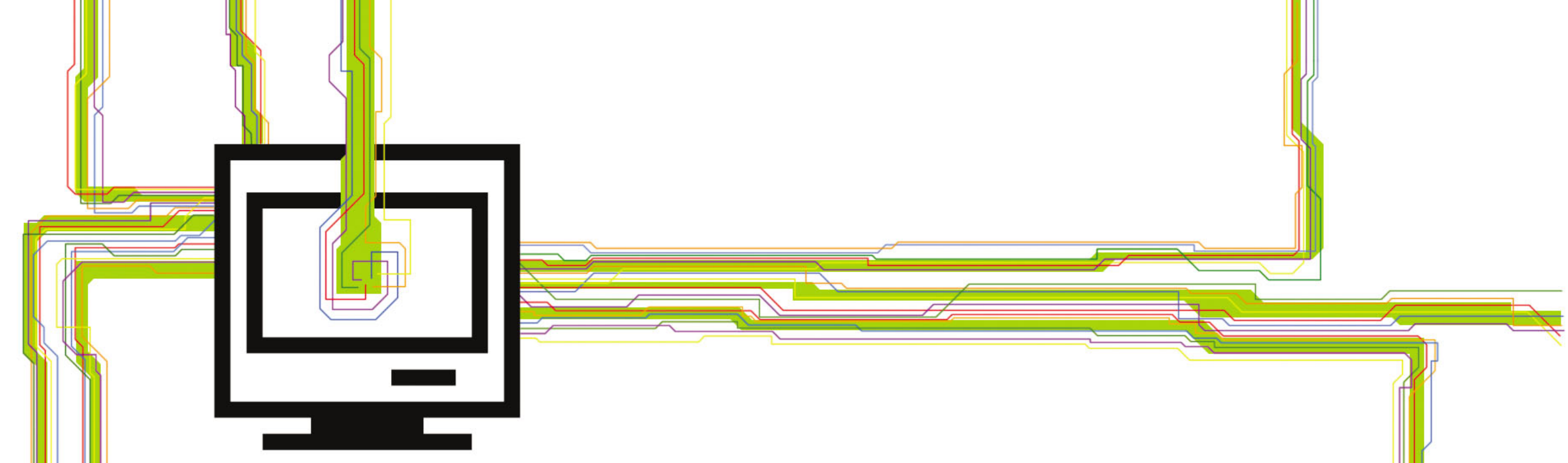
Any time you operate a server on one PC behind a router, it becomes necessary to direct traffic to that machine. A virtual server defines one port on your router for redirection to an internal LAN IP address. On the DGL-4300, that involves logging in to the router on its private IP (192.168.0.1, by default), clicking the Advanced tab, and filling in the corresponding ports and addresses. The Gaming tab is similar, only it opens multiple ports for games and other multimedia applications.

Various other filters and access controls help control who gets to use network resources at what times and if you want to set a schedule. Even if you don't run your network with an iron fist, you'll want to click the Basic tab and run the Wireless Security Setup Wizard to keep unauthorized neighbors from hopping on your connection and siphoning bandwidth.

In Retrospect

Ultimately, your networking equipment should deliver the best performance possible while protecting against security holes. Windows Firewall is a good first step, but you'll want a solid hardware firewall as first defense and perhaps a software solution managing outbound traffic on each client. If you don't have ActiveArmor available, check out ZoneAlarm, one of the most popular software firewalls available. ▲

by Chris Angelini



tomorrow's network

Examining Future Home-Networking Technologies

We keep hearing the same promises. Every electronics device we own will be able to talk to one another, from our car stereo to our toaster. We'll be able to stream high-definition movies from a PC to our home theater system. We'll be able to connect to our home network from anywhere using portable devices.

These days are coming, and they're closer than you might think. Gigabit Ethernet for home networks is gaining traction already, and wireless networking companies are cranking out faster and faster products. Over the next few years, the cutting edge will become commonplace, and we want to make sure you don't miss out on any of it.

Hardwired

Now that GbE is the high-end standard for wired home networks, you may have heard a lot of talk about its successor, 10GbE, which businesses have used for years. As the name implies, this newer standard is 10 times faster than GbE's theoretical maximum bandwidth of 1.25GBps, using copper or fiber optic cables. That's enough speed to transmit an entire DVD across your network in a few seconds, but do you really need it?

Let's pretend the stars align, and all of the broadcasters on earth suddenly decide to offer all of their content as high-definition downloads. Because we're already playing in the realm of the impossible, let's say they decide to offer all of it in 1080p at 60fps, which is the best HD standard we're going to get for quite some time. A raw 1080p60 signal needs 3Gbps of bandwidth, and GbE obviously won't stream that much data, so 10GbE is the clear choice.

Now let's return to Earth. Content in 1080p at 60fps just isn't going to happen on a large scale right now. Thanks to the magic of data compression, the high-definition feeds you get from your cable company require only 19.3Mbps per channel, meaning you can stream multiple channels of HD content via a 100Mbps Ethernet connection.

This HDTV from Haier receives digital video signals from the bundled media server wirelessly using UWB.

Standards To Watch

802.11n and UWB might get most of the buzz these days, but be on the lookout for other technologies that will change the way you use your network.

802.16e

WiMAX promises to bring high-speed wireless broadband Internet access to the masses, and 802.16e promises to give you more than a 1Mbps connection from your car or other moving vehicle.

802.20

Much like 802.16e, 802.20 brings WiMAX to mobile users. The big difference? It's designed to deliver a connection even if you're moving as fast as 155mph, so now you'll be able to shop online from your private helicopter.

BPL (Broadband over Power Line)

High-speed Internet access from any socket in the house? Where do we sign up?

HomePlug AV

More love for the power outlets: Network at up to 200Mbps using your existing wiring.

ZigBee

Cheap, low-powered radios may let your electronics equipment network with one another, from the fridge to the TV. ▲

Pre-802.11n devices such as Netgear's RangeMax 240 Wireless Router offer bandwidth of up to 240Mbps now, but that's just a fraction of what the true 802.11n specification handles.

When prices finally reach levels desktop users can afford and there's content out there that actually requires that amount of bandwidth, 10GbE will be nice, but don't expect that to happen for a few years: Right now a single network interface card such as Intel's PRO/10GbE CX4 Server Adapter costs about $1,000.

Wireless Wars

The MIMO devices we discussed on page 55 are merely heralds of what's to come in wireless networking. They may have longer range and faster speeds than 802.11a, 802.11b, and 802.11g devices, but they all use proprietary technology. If you buy a MIMO router from Linksys, it won't work with the Netgear MIMO NIC. That's about to change as new standards emerge, but the main problem lies in figuring out which standard will prevail.

The warriors in this wireless cage match are 802.11n and UWB, each with different capabilities, backers, and underlying technology. Both are still being hammered out, both are racing to be first to market, and both are very interesting.

802.11n uses MIMO technology and is backward compatible with 802.11a, 802.11b, and 802.11g, but the initial specification supports a transmission rate as high as 600Mbps and an actual data throughput rate of about 400Mbps. That's several times faster than current MIMO devices and will make it possible for you to stream multiple channels of high-definition content to your home theater system without having to run cables into your living room.

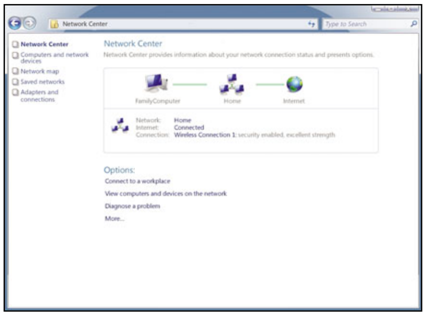
Dozens of companies back this technology, including industry giants such as Cisco, D-Link, Linksys, Intel, and Netgear. The problem is that manufacturers are divided into two main groups. WWiSE (World-Wide Spectrum Efficiency; www.wwise.org) has members such as HP, Motorola, Nokia, and Texas Instruments, while TGn Sync (www.tgnsync.org) has the likes of Cisco, Hitachi, Intel, Mitsubishi, Panasonic, Samsung, Sharp, Sony, and Toshiba on board. With the formation of the EWC (Enhanced Wireless Consortium; www.enhancedwirelessconsortium.org) in October 2005, 802.11n proponents came one step closer to putting aside their differences and drafting a true standard that will likely get 802.11n products on the shelves by the end of this year, but there are still no guarantees.

UWB is a completely different technology that isn't backward compatible with 802.11a, 802.11b, or 802.11g products. It requires very little power (as little as 750 milliwatts in its current form) and has a short range compared to 802.11n. Although 802.11n products can send a usable signal up to 200 meters, UWB is designed for distances of only a few dozen meters and is usually positioned as a cable replacement for USB 2.0 and FireWire.

UWB supporters are split into two camps, so there's no telling when or if these groups will agree on a unified standard. On one side is the UWB Forum (www.uwbforum.org), with members including Belkin, Fujitsu, Mitsubishi, Motorola, Samsung, and Sony, among scores of others. On the other side is the WiMedia Alliance (www.wimedia.org), whose promoters include such big names as HP, Intel, Microsoft, Philips, Samsung, and Sony.

UWB chips are already available from companies such as Freescale, which offers an XS110 chipset that operates at 110Mbps and an XS660 chipset that operates at up to 660Mbps. By the end of this year, Freescale plans to offer a chipset with 1.6Gbps of bandwidth, which is enough to transmit an uncompressed 720p or 1080i high-definition video signal. WiQuest is another major player in the UWB market and demonstrated a UWB 1Gbps chipset last year.

These high speeds will let you do things such as download high-resolution maps to a handheld device and transmit them to your car's GPS or feed a high-definition signal to a wall-mounted HDTV without using video cables. In fact, Haier is putting a 37-inch LCD HDTV and digital media server combo



Network Center

Network Center provides information about your network connection status and presents options.

Network: Home
Internet: Connected
Connection: Wireless Connection 1: security enabled, excellent strength

Windows Vista promises a slew of enhanced networking features, but it remains to be seen how many of these will truly help end users.

Data By The Busload

As network speeds continue to ramp up, the system bus is quickly becoming the main networking bottleneck. Run a Gigabit Ethernet card at full throttle, and you're using about 95% of the available bandwidth on a first-generation PCI motherboard. There are newer-generation PCI motherboards that support 2.112Gbps or even 4.224Gbps, but truly taking advantage of Gigabit Ethernet and future technologies requires upgrading to technologies such as PCI Express.

PCI-E has been around for a while and was designed specifically to handle the kinds of high-speed data transfers that PCI chokes on. It eschews PCI's single parallel data bus in favor of multiple serial data paths dedicated to each device, with the obvious benefit that devices don't have to trip over one another when sending data to other parts of the computer.

In PCI-E's initial form, each data path could handle a maximum bandwidth of 2.5Gbps, which is more than enough for Gigabit Ethernet. The fastest PCI-E x16 models handle 80Gbps, providing plenty of overhead for 10GbE cards and beyond—far beyond. ▲

Products such as Linksys' Wireless-G Exterior Access Point, which is designed for outdoor use, get their electricity from PoE technology, so they're easy to place anywhere.

on the market later this year that will incorporate UWB to let the server send video to the display up to 20 meters away. (Pricing wasn't announced at press time.)

New Vistas

When you're budgeting for new 10GbE and high-speed wireless networking hardware, be sure to save some cash for Windows Vista. It should be available later this year, and the developers are promising a slew of networking enhancements. Most of the changes benefit software developers or IT managers, but there are some that will appeal to us power users.

One highlight is the ability to divide network traffic among multiple processors on the same machine, which Microsoft calls RSS (receive-side scaling). This will be of great benefit to servers initially, but home users will enjoy the benefits as they gain access to faster and faster broadband Internet speeds. Currently Windows XP sends all network traffic to one CPU, regardless of whether you (or the manufacturer) install multiple processors in the computer, and that causes glitches in video and hiccups in applications when you stream large files to or from the computer. With Windows Vista and multiple CPUs, these problems should go away, and it's nice to know that if broadband speeds ever rise to 1Gb or faster, all of that traffic won't overwhelm your computer.

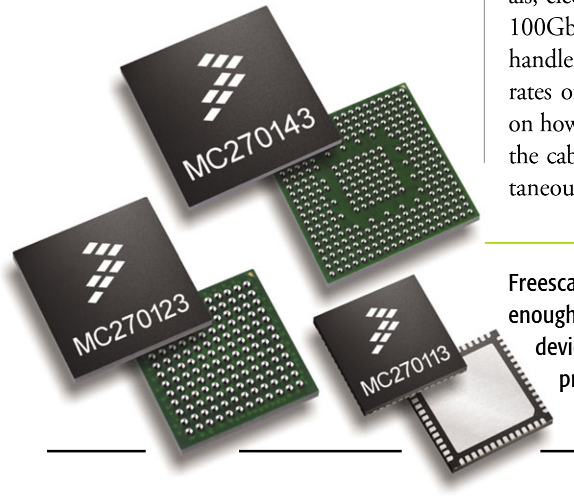
One of the first things we do after installing Windows is tweak our network settings, so everything works as smoothly as possible. Microsoft says Vista will handle most of these optimizations by default. It also says that Vista will respond more quickly when packets are lost during a network transmission, letting your connection sustain its maximum possible speed much better than is the case with WinXP.

Beyond Tomorrow

You can never have enough network bandwidth, and optical networks that rely on fiber-optic cable have incredible potential. In September 2005 Lucent Technologies and Bell Labs used an optical cable to transmit Ethernet network data at 100Gbps. That's a huge increase over the 40Gbps bandwidth optical SONET setups support but still represents only a tiny fraction of optical cable's true power. Luxtera also reported last year that the same optical infrastructure 10GbE currently uses could support data rates of 1Tbps or even faster. Standard copper wiring is strained to the limit at 10Gbps, and Luxtera says that even if manufacturers substitute different materials, electrical interconnects will never reach 100Gbps. Optical cables could eventually handle theoretical maximum data transfer rates of 10Tbps (or even faster depending on how many different wavelengths of light the cables could eventually transmit simultaneously) and wouldn't have the latency problems inherent to electrical cables. It will be years before optical network prices fall to levels consumers can handle, but we'll be waiting impatiently.

Don't expect wireless standards to change for quite some time. Security issues, massive competition for market domination, and the need to make sure all of the equipment works together means that 802.11n and UWB will be around for years. What you can expect is that various manufacturers will come up with proprietary technology that enhances the speed and range of 802.11n and UWB, but that only works with products that come from that manufacturer. You will still be able to use products from different companies if you stick to the basic 802.11n or UWB support, but if you feel the need for speed, you'll have to give all of your cash to one company. Manufacturers may work together to create a standard but don't expect them to lie still and leave money on the table once they've made an agreement. ▲

by Tracy Baker

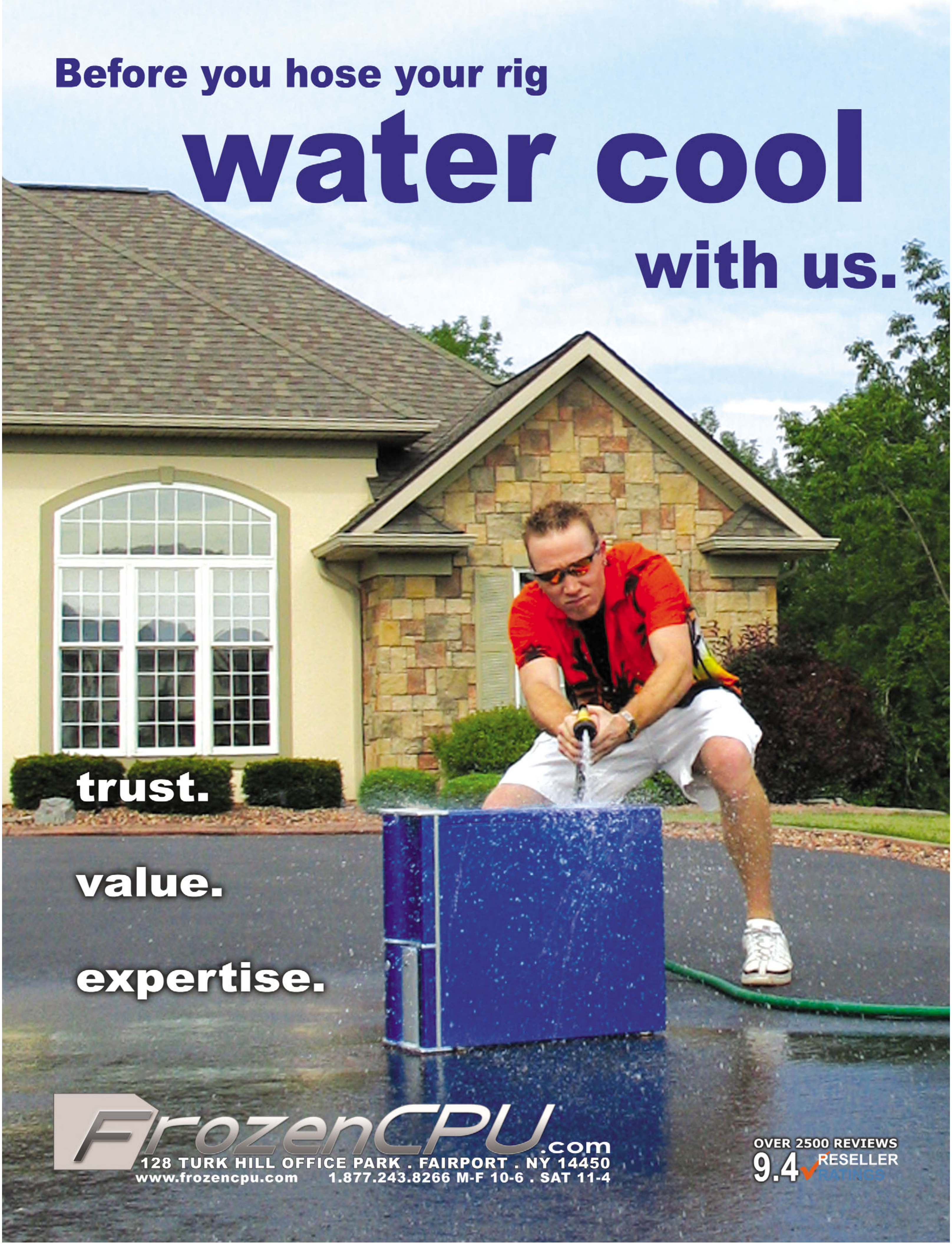


Freescale's XS110 UWB chips require little enough power that they're viable for devices such as cell phones, but they provide more wireless bandwidth than a 100Mbps wired network.

More Power

Networking devices that get their electricity from the Ethernet cable using 802.3af PoE (Power over Ethernet) technology should expand dramatically in the future and make it much easier to place networking devices throughout your house, or even outside it.

The main problem with PoE right now is that it only supplies a theoretical maximum of 15.4 watts of power, but that will all change with PoE Plus technology. The newer standard should deliver at least 30W, and probably more, which is enough to run some notebook computers. Products using PoE Plus may not appear until 2007 or later, but in the meantime companies such as PowerDsine offer devices right now that deliver more power than PoE. The company's 8012 High Power Midspan, for example, delivers up to 39W of power to each attached device. It's as easy as running cables from your existing router or hub to the midspan and then running them from the midspan out to your PoE devices. ▲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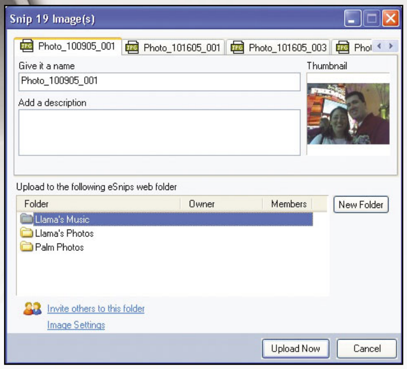
OVER 2500 REVIEWS
9.4 RESELLER RATINGS

by Warren Ernst

The Bleeding Edge Of Software

Inside The World Of Betas

eSnips 1.1.0.1 Beta



Give it a name: Photo_100905_001

Official product name: eSnips
Version # previewed: 1.1.0.1 Beta
Publisher: Net Snippets
Developer and URL: Net Snippets; www.esnips.com
ETA: Q1 2006
Why you should care: A great mix of free public and private Internet storage.

There's no shortage of Internet services that give you online space to post information and share photos, but eSnips, which gives you 1GB of space, is among the easiest to use, offers optional plug-ins for many browsers, and is free.

First, you sign up for a free eSnips account. Then you download and install an IE toolbar or Firefox/Netscape extension, which makes adding to your online space much simpler and convenient. With the plug-ins you can easily grab URLs, a screen shot (either square or irregularly shaped), or text and slap it directly into your eSnips' folder hierarchy. You can also use the toolbar to upload files (in bulk) or whole folders of photos.

You can access this content wherever you go, and eSnips has tons of features to make sharing content with others easy. You can set folders as private or public and send email invitations to others to view your public folders. Visitors can view photos, download slideshows, leave comments, add their own files, and even invite others to view content. As the account's owner, you have access to various statistics, including who's seen what, who's added new material, or who else has been invited.

If there's a problem with eSnips, it is perhaps that it's too flexible. It's a standard public photos site in that there are invitations and user-tracking, but it isn't a go-anywhere Desktop because dealing with many documents without the browser plug-in is too cumbersome. Still, it may be just the tool for sharing digital media with the right group of people, and at a price that's hard to argue with. ▲

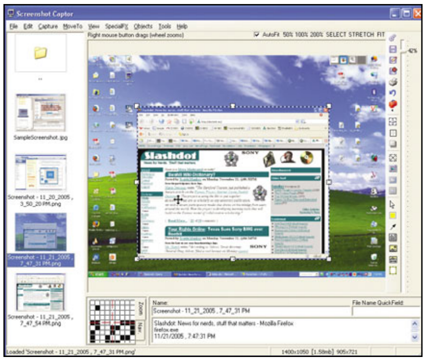
Screenshot Captor 2.05.02 Beta

Taking screen shots is something everyone does once in awhile, and the basic tools to do it have been built into Windows for years. Essentially, you copy the screen to the Clipboard via the PrintScreen key, Paste it into Paint, and save the file. There are many professional tools that streamline this process, but their cost seems hard to justify for taking the occasional screen grab. Fortunately, there is Screenshot Captor, which is full of features and is free. Sort of.

SC eschews the common GPL license of open-source software, and you must register SC to get an unlock code. Registration is free, however, as is the unlock code. If you like the software or the site it comes from, you're encouraged to make a donation, which can be as large or small as you like, and you can donate more as you use more software packages. In addition to warm fuzzies, donations garner small perks at the site and guaranteed free access to future software, should it become commercial. Neat idea.

After you use SC a while, you'll probably want to make a donation; it's that good. The app takes screen shots, window and active-area shots, and so forth in a rapid-fire manner with keyboard shortcuts. Once captured you can easily add captions, arrows, crop, magnify, blur, sharpen, and edit to your heart's desire. Saving files in different formats is no problem, and the program can even name them in a numeric sequence automatically.

The interface takes some getting used to, but a thorough Help file provides all answers. And for the app's price, you can hardly quibble with having to review a few instructions. ▲


Screenshot Captor
File
Edit
Capture
MoveTo
View
SpecialFX
Objects
Tools
Help
Right mouse button drags (wheel zooms)
AutoFit
50%
100%
200%
SELECT
STRETCH
FIT
SampleScreenshot.jpg
Screenshot - 11_20_2005 , 3_50_20 PM.png
Screenshot - 11_21_2005 , 7_47_31 PM.png
Screenshot - 11_21_2005 , 7_47_54 PM.png
Slashdot
Zoom
Nav
File Name QuickField

Name: Screenshot - 11_21_2005 , 7_47_31 PM

Slashdot: News for nerds, stuff that matters - Mozilla Firefox
firefox.exe
11/21/2005 , 7:47:31 PM

Loaded 'Screenshot - 11_21_2005 , 7_47_31 PM.png'
1400x1050 [1.58mb] 905x721

Official product name: Screenshot Captor
Version # previewed: 2.05.02 Beta
Publisher: DonationCoder.com
Developer and URL: DonationCoder.com; www.donationcoder.com
ETA: Q1 2006
Why you should care: You won't find a more full-featured screen capture program for less.

UP TO SPEED

Upgrades That'll Keep You Humming Along

This month, Firefox grows up from past release candidates, Easy CD-DA Extractor gets improvements, and AOL's new IM client is dripping with freshness.

Upgrades

AOL AIM Triton

AOL's new IM client includes voice and video chat and an integrated email client with 2GB of free storage. Mobile users can now get a Buddy List on their cell phone and send Desktop IM messages via SMS.

Get it at: www.aim.com

Easy CD-DA Extractor 9.0

The CD ripper/copier gets bug fixes, updated AAC encoders, and support for the 3GPP formats that next-gen mobile devices use.

Get it at: www.poikosoft.com

Firefox 1.5

The official Firefox upgrade finally arrives with automatic updating, performance and pop-up blocker tweaks, security patches, and drag-and-drop manipulation of tabs.

Get it at: www.mozilla.org

Google Talk 1.0.0.78 Beta

Google Talk, essentially a voice-enabled IM client, was prone to crashes in early iterations; these tweaks may help. You can place VoIP-like calls to others running the client.

Get it at: www.google.com

HyperSnap 6.0 Beta 7

The screen-capture utility moves closer to an official version 6 with this beta. New features include TextSnap to capture on-screen text to an editable format. Longtime users will notice more and deeper image-editing tools.

Get it at: www.hypersnap-dx.com

McAfee Avert Stinger 2.5.9

The free, standalone virus/worm removal tool detects major known strains and variants as of late November 2005. File names in this version have been changed to thwart anti-stinger virus tactics.

Get it at: vil.nai.com/vil/stinger

Microsoft ActiveSync 4.1

The sync tool for WinXP and Windows Mobile devices enlists new partnership wizards, increases file-transfer performance, and lets users synch photos attached to Outlook contacts.

Get it at: www.microsoft.com

WindowBlinds 5

WindowBlinds adds per-pixel alpha blending to create glass-like textures on toolbars and borders, and you can adjust the hue and color-saturation levels of the Windows UI.

Get it at: www.stardock.com

(Unofficial) Win98 SE Service Pack 2.1a

This unauthorized release rolls up all of Microsoft's own updates and adds hot fixes, the Virtual Basic and Visual C++ runtime libraries, and OS-customization tools.

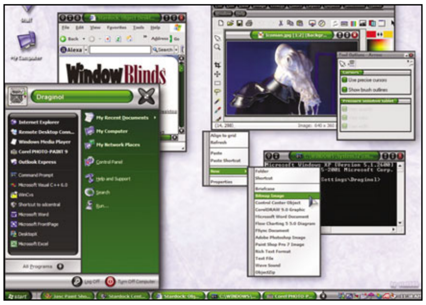
Get it at: exuberant.ms11.net/98sesp.html

Driver Bay

ATI Catalyst 5.11

The Radeon X1300 and X1800 get adaptive antialiasing options in this release. The X1300 gets CrossFire support, and ATI promises "massive" performance gains for X1800s with 4X antialiasing on in OpenGL titles, including 60% increases in Quake 4.

Get it at: www.ati.com



WindowBlinds' new version has even more features to tweak Windows' interface.

Creative Sound Blaster X-Fi Series Driver 2.07.0004

These drivers improve CPU performance in EAX-enabled games and resolve some audio distortion issues, mode-switching problems, and MIDI/SoundFont compatibility issues.

Get it at: www.creative.com

Logitech Gaming Software for 64-bit Windows XP

For Logitech USB HID-Class game devices, this suite adds support for WinXP Pro x64 (which excludes the non-HID-based Wingman Force and Wingman Formula Force). Gamers can map the POVs\D-pads and swap joysticks\D-pads on Dual Action Pads.

Get it at: www.logitech.com

Logitech SetPoint 2.46 for Windows XP Pro x64 Edition

For Logitech mice and keyboards, these drivers and customization software bring Logitech productivity peripherals up-to-date with 64-bit Opteron and Xeon CPUs.

Get it at: www.logitech.com

Nvidia ForceWare 81.95

This release adds support for the GeForce 7800 GTX 512 and 6800GS and new SLI compatibility with various cards and with TV-out/HD-out. Dual-core CPUs get better performance, and gamers get more speed in Quake 4 and Call of Duty 2. A ForceWare 81.94 version for the mobile Go 7800 GTX GPU provides performance gains.

Get it at: www.nvidia.com

Playstation Portable Firmware 2.60

Sony is issuing near-monthly upgrades to the PSP firmware. This update adds support for playback of WMA audio tracks, RSS feed support to the Web browser, and the downloading of some copyrighted video content to the Memory Stick Duo.

Get it at: www.us.playstation.com

by Steve Smith

RSS Readers

The Word On Aggregator Apps

Once upon a time, in the early days of the Web, there was push technology, which promised to deliver the Web to your desktop based on your specific needs. "The browser is dead!" crowed the cover of *Wired*; subscriptions and channels would replace Web pages as the main way we'd get information on the Internet. But push technology proved too arcane and narrowly supported, and it just sat there.

Fast-forward 10 years. RSS (Really Simple Syndication) is now doing the pushing, or rather, the publishing. Sites with RSS feeds let you receive a simplified, digest version of their articles. Think of it as the Web version of a headline or stock ticker on a building façade: Instead of slogging through 50 sites, you can skim 50 feeds, each no more than a sentence or so. For both the reader and publisher, RSS is easy to set up; widely supported; and at this point, almost a requirement for any regularly-updated site.

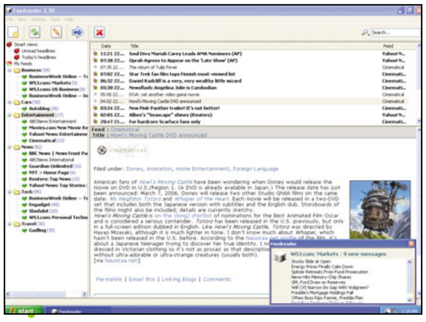
The best way to get the most out of RSS as a reader is to either use a program that supports it as part of its package of functions—such as Firefox or the upcoming Internet Explorer 7—or use a program dedicated to reading and consolidating RSS feeds into digests. These apps, called aggregators, are being marketed more and more to ordinary folks who want to get a handle on all the information they're flooded with each day.

I looked at several types of aggregators, some Web-based, some browser-based, and some that integrate into other programs (such as Microsoft Outlook). It's always best to pick the application that fits your existing work habits. If you aren't particularly loyal to a given browser, for instance, you can use a product such as FeedDemon as a gateway from your feeds to your browser. If you're a browser guy, you can go with something as simple as Google's RSS aggregator. If you're an Outlook lover, RSSPopper turns feeds into mail messages.

Feedreader

Feedreader makes for an excellent starter RSS reader; it's small; lightweight; and most importantly, is free and open source. Its feature set isn't as grand as some other programs here, but it gets the job done nicely and has some handy touches.

Feedreader uses a three-pane view, including a hierarchy tree with a list of your feeds broken down by category, a list of articles in the currently selected feed, and the digest of the currently selected article. A filtering function lets you highlight or flag articles that match certain keywords or criteria. The program comes with two such filters preinstalled called Smart Views; one is for all unread articles and the other is for today's articles.



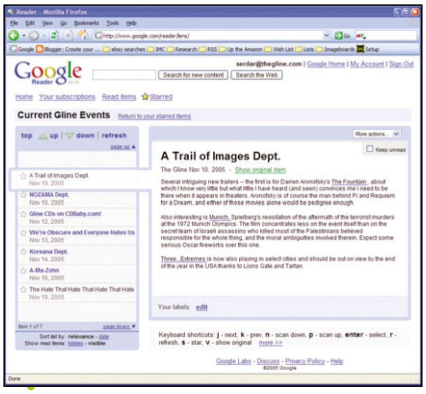
- **Feedreader**
- **Free**
- **Feedreader**
- **www.feedreader.com**

CPU CPU CPU C

By default the program harvests new headlines every hour or so, which you can change. When new headlines come in while the program is minimized, the app pops up a small box at the bottom of the screen with a list of all the newly arrived articles. You can disable this, but I found it useful and unobtrusive enough to keep switched on. The biggest missing feature is a newspaper-type overview for multiple feeds.

Google Reader (Beta)

Google isn't just the new overlord of Web search; it's also the master of Web-based utilities in general, such as Google Maps. Google's RSS reader is another great example of this. The reader is so slickly put together you wonder how Google did it without using Flash or a plug-in. As an RSS utility, it's also quite good; it doesn't have some of the slicker features a few programs here have, but it handles the basics quite capably.



- **Google Reader (Beta)**
- **Free**
- **Google Labs**
- **reader.google.com**

CPU CPU CPU

To use the service, you need an account with Google (it's free) and either the exact URLs of the feeds you want to add or the pages the feeds are hosted on. When you add a feed, it's called a subscription, and you can also tag a subscription with one or more keywords (called

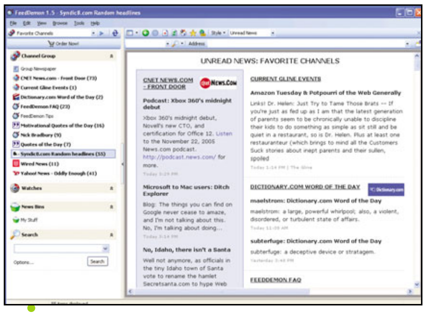
CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

labels) separated by commas. The label metaphor is actually handier than the folder metaphor most other programs I tested use because you can place a feed into more than one category this way.

Click a subscription and you get a list of all the articles available in that feed. The selected article is called out and reprinted into a separate pane when you select it. A drop-down context menu for the article lets you send the selection via Gmail, blog it with Blogger, or remove the subscription entirely. You can also star items for follow-up (much like in Google Groups). Google Reader's most powerful feature is its direct integration with the Google search engine; you can directly add feeds that turn up as a result of a Google query.

NewsGator Technologies FeedDemon

FeedDemon has some of the best presentation functions among the programs I reviewed. The app is like a miniature digital printing press for your feeds, arranging them into an electronic newspaper you can read with ease.



FeedDemon
$29.95; free 20-day trial
NewsGator Technologies
www.bradsoft.com/feeddemon

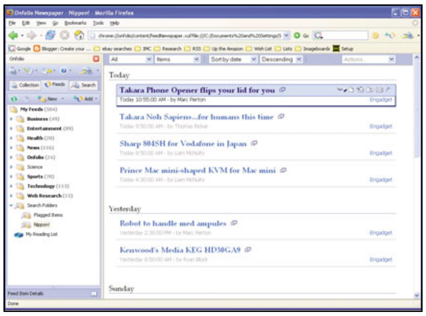
Once you set up your feeds—either manually or by importing an OPML file (a standard format for feed definitions)—you can group them into channels and publish a newspaper view of all the unread articles for a channel. The views are highly customizable and based on standard CSS templates. If you want to see articles that match certain search terms, you can create a Watch, which is an automatically generated search view, and browse by the search term. Like Feedreader, the program can also alert you with a pop-up notification when new articles arrive.

There are a few drawbacks. Atom feeds show up with HTML markup rendered as raw code (although this will be fixed in a future release). Also, the list of blogging tools seems limited to standalone applications, not Web services such as Blogger, LiveJournal, or Moveable Type.

Onfolio Professional

Onfolio isn't just an RSS aggregator; it's billed as an "online research tool," or a way to aggregate online information and save copies for personal use. If you're interested in using RSS as a way to continually gather a library of information and links on given subjects, it's extremely powerful.

The program runs either as a sidebar in a Web browser (IE and Firefox are supported) or as a standalone Desktop toolbar. Onfolio can also import RSS feeds from existing lists of bookmarks or files and detect feeds embedded in Web pages. You can organize feeds into a hierarchy of folders, including custom search folders that can automatically generate lists of articles that match given criteria. For me, the best RSS feature is the newspaper view. Click My Feeds and the program aggregates *all* your unread feeds into a single newspaper-style Web page, which is a perfect way to get everything at a glance first thing in the morning.



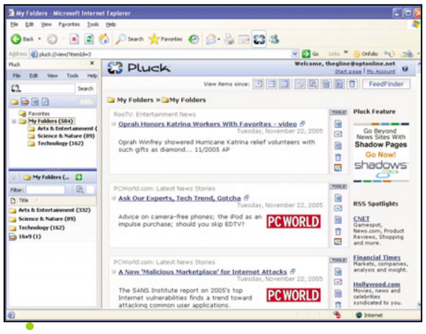
Onfolio Professional
$99.95; free 30-day trial
Onfolio
www.onfolio.com/product

What makes Onfolio exceptionally powerful is how you can use it as a way to organize and filter all kinds of online information. If you see a page you like and want to save it for future reference in your collection, you can do that with one click. Ditto an entire site (although that can be time-consuming), and the downloaded results are also searchable.

Pluck

Pluck is another free standalone application; it's designed to work in conjunction with the online Pluck service. You don't need to use the Pluck site to run the application, and the program's development is sponsored in part by selling Pluck's Web-portal solutions. You do need to create a free Pluck account to download the program, but that's it.

Once you install the program, which runs as a sidebar in IE or Firefox, it sets up a group of preinstalled feeds called the Starter Pack. This gives you an idea of how the program works. Feeds are organized into folders and subfolders, and if you have existing feeds bookmarked, you can import them painlessly. The program doesn't seem able to detect feeds embedded in a Web page, though. Persistent Searches work like the filters in other programs described here, just supply some search terms and any articles that match the search are automatically presented in its corresponding persistent search folder. You can also have the program tickle you



Pluck
Free
Pluck
www.pluck.com/products/rss-reader.html

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

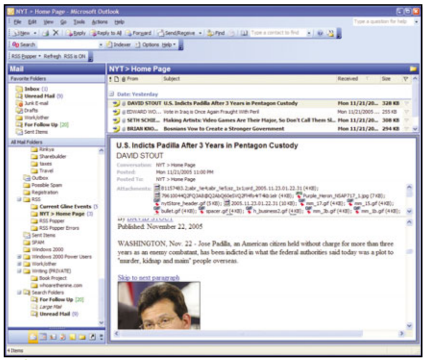
with a Desktop notification when new articles come in.

Pluck has some of the same graphical aggregation features as the other apps I tested. Double-click a folder and all the unread feeds in that folder are formatted in a newspaper-style report. A Tools column next to each item lets you bookmark, email, or discuss an item on the Shadows .com discussion site, which among other things, lets you tag a link as Not Worksafe.

Sagi RSS Popper

If you like using Outlook to manage most of your personal information, it might make sense to use it to manage your RSS feeds, too. RSS Popper, a free Outlook add-in, turns Outlook into an RSS reader of its own. The integration is pretty elegant, although you need to be mindful of not letting Outlook's folders get cluttered with previously-read articles.

RSS Popper works by adding a new RSS folder into Outlook and adding subfolders under it that correspond to different categories for feeds you create. As new articles come in, they're placed in these folders as notes. You can use the Unread Mail folder view in Outlook 2003 to see them at a glance. To import or export feeds, you can do that via the standard OPML file format.



RSS Popper
Free
Sagi
rsspopper.blogspot.com/2004/10/home.html
CPU CPU CPU C

When adding a feed, you can specify a refresh interval for each feed (the default is 900 seconds) and whether to download the page the feed links to. Another Outlook-centric feature is that you can have all email links redirected through RSSPopper.com to disable the antiphishing features in Outlook 2003. Web sites using CSS, though, don't render very well when downloading the contents of the linked page locally. ▲

by Serdar Yegulalp

RSS In Firefox

Firefox was one of the first Web browsers to include RSS functionality. When you browse a Web page that has feeds available, Firefox turns on an orange radio signal icon in the bottom-right-hand corner of the browser window. Click it and you'll get a list of the available feeds for that Web page. Select one and you can place what's called a Live Bookmark into any of your Firefox bookmark folders.

When you point the cursor at a Live Bookmark, it opens up like a subfolder and displays a list of all the articles available from that feed. There's no search or filter functionality for feeds, though. You have to open each Live Bookmark manually and read the article list to see if there's anything that matches your interests. If you have more than five or six feeds, the best approach is to put them all into one folder and browse them by simply dragging the mouse pointer across them, which gives you a nice at-a-glance view. For more elaborate functionality than this, though, you'll need to go with a third-party program. ▲

How Their Features Compare

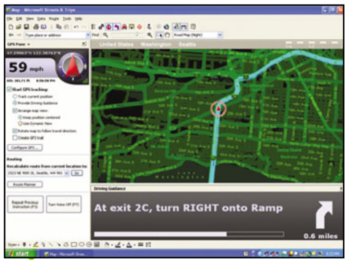
The feature sets for each RSS here were remarkably robust. Most surprising was how similar the features were but how differently they were implemented. Almost all the aggregators, for example, could handle the Atom feed format (used by sites such as Blogger and LiveJournal), but many couldn't auto-detect feeds embedded in Web pages, which Firefox does natively. All but two (Google Reader and Firefox's native RSS functions) can alert the user in some way when new articles arrive. RSSPopper's articles arrive as if they are email and work through Outlook's own notification functionality.

Product/Feature	FeedReader	Firefox RSS	Google Reader	NewsGator Technologies FeedDemon	Onfolio Pro	Pluck	Sagi RSS Popper
Import/export	Y	Y	N	Y	Y	Y	Y
Newspaper view	N	N	N	Y	Y	Y	N
Sorting	Y	Y	Y	Y	Y	Y	Y
Searching	Y	N	Y	Y	Y	Y	Y
Categorization	Y	Y	Y	Y	Y	Y	Y
RSS 2.0 Support	Y	Y	Y	Y	Y	Y	Y
Atom Support	Y	Y	Y	Y	Y	N	Y
Auto-detect feeds in Web pages	N	Y	N	Y	Y	N	N
New article notification	Y	N	N	Y	Y	Y	Y
Price	Free	Free	Free	$29.95	$99.95	Free	Free
CPUs:	CPU CPU CPU C	CPU CPU CPU C	CPU CPU CPU	CPU CPU CPU CPU	CPU CPU CPU CPU	CPU CPU CPU C	CPU CPU CPU C

CPU Ranking: ☐ 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by William Van Winkle

Microsoft Streets & Trips 2006 With GPS Locator



Streets & Trips 2006 With GPS Locator
$129
Microsoft
www.microsoft.com

CPU CPU CPU

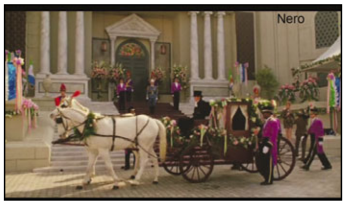
Streets & Trips 2006 sports a well-organized UI with many reconfigurable panes for mapping, drive guidance, GPS navigation, and route planning, complete with drawing and highlighting tools for adding trip notes. Improvements include a crisp female voice giving navigation directions. You can import Outlook contacts and convert them into "pushpin" points on maps. There are over 1.8 million points of interest, which are easy to browse or search, but reviews for such items as restaurants are absent. There's new integration with MSN Virtual Earth (requires a live Internet connection), exporting to Pocket Streets & Trips for Windows Mobile devices, and a night mode view.

S&T has a "last quarter-mile" problem; it's very good at getting you near a target but not always in front of it. For example, when I placed a restaurant waypoint half-way through my trip plan, S&T got me to the main intersection before the restaurant but not through the requisite right turn or into a strip mall parking lot.

Most disappointing was S&T's poor rerouting. When trying to recalculate the route to a passed waypoint from the present location, S&T started to give new directions and then apparently gave up and let me go on with an ambiguous "proceed to route" command. Nothing on the map indicated which way to go, and turn directions still left me proceeding to the trip's end.

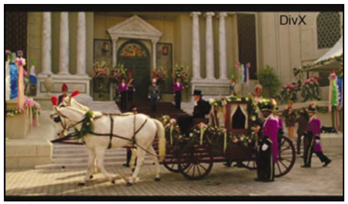
Other annoyances: If a pushpin has the same name as existing map items (such as "home"), the pushpin shows up last in the list of identical search matches, when it should be first. S&T can use Wi-Fi access points to locate you in the absence of GPS data but doesn't include Wi-Fi hotspot points of interest data a la JiWire. Also, Microsoft should know a tabbed interface is easier to use than drop-down menus, especially when navigating while driving. ▲

DivX 6.1 vs. Nero Digital



Nero Digital
$79.99 (in Nero 7 Ultra Edition)
Nero
www.nero.com

CPU CPU CPU C



DivX 6.1
Free
DivX
www.drdivx.com

CPU CPU CPU C

From home theater disc players to PMPs, it's time to choose between the new Nero Digital and DivX 6.1 codecs. War of words between the companies is extensive, but we boiled it down to taking a 292MB VOB file of DVD trailers and running them through Nero Recode (in Nero 7 Ultra Edition) and Dr. DivX 2.0 (in its third beta).

We first aimed for a default, ordinary encoding job with balanced/standard CPU priority, 4Mbps video bit rate, two-pass encoding, DivX's Home Theater profile, and all other defaults fit to a 700MB CD. Nero turned in a 404.8MB file in 23:27 (minutes:seconds). Dr. DivX 2.0 hefted up a 557.5MB file in 56:45. The time difference is striking, but DivX noted beta refinements are still being made. For DivX's roughly 35% additional bits, you do get sharper image quality with richer saturation and contrast.

Nero warned us that its ASP codec may lose against DivX, but its AVC codec was much better. We ran a test at these settings: Nero: 700MB CD target, maximum definition (9.80Mbps), two-pass, 5.1 audio, Extra Quality, H.263 quantization, and high CPU priority; Dr. DivX: High Definition, insane quality, H.263 Optimized quantization, two-pass, 4,000Kbps average bit rate, 128K MP3 stereo, and high thread priority. Nero Recode paid out a 290.2MB file in 32:21, Dr. DivX a 285.9MB file in 2:47:08—seriously.

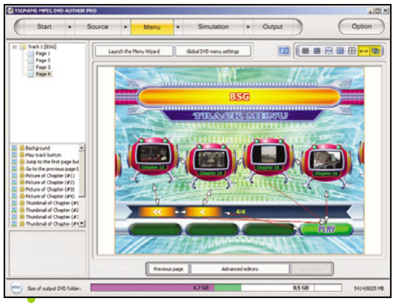
Again, DivX 6.1 had much crisper images, despite the lower bit rate. Contrast was better and detail generally more pronounced. Yet Nero remained truer to the VOB file's original color tone. DivX seems to make video more vibrant, but dark areas at these settings can fall into black and lose details. In many cases at full screen, Nero displays subtle jaggies where DivX is much smoother, although in small details this antialiasing can lead to slight detail loss.

Another arguable point is which host application is better. For simple jobs, I prefer Nero Recode, which echoes the Burning ROM UI and keeps many options accessible in a little space. DivX is less succinct. That said, there are plenty of third-party DivX encoders that are usually more complex but more powerful. Between Nero Recode and Dr. DivX, Nero's time savings wins. For small players I'd take Nero's convenience. For larger screens, I'd lean to DivX. ▲

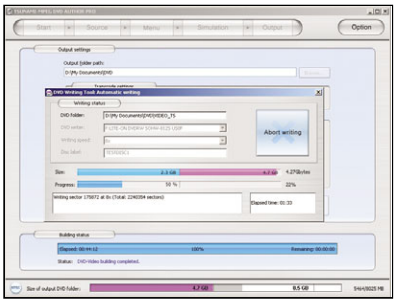
CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Warren Ernst

TMPG Tsunami DVD Author Pro



Tsunami DVD Author Pro
$99.95
TMPG
www.tmpg-inc.com



If the video DVDs you've edited are starting to look a little pedestrian and you want to take your discs to the next level but don't have the time or energy to learn professional-level DVD-authoring software or techniques, Tsunami DVD Author Pro may just be what you need. Don't throw out your old tools, however, because DVD Author Pro isn't an all-in-one solution and certain source files will require prior conversion.

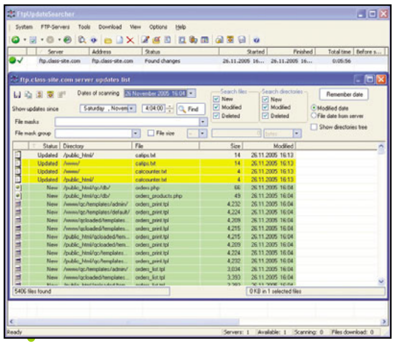
DVD Author Pro's user interface looks and feels a lot like other consumer-level authoring programs, including having a bar of buttons running along the top of the app's window. These buttons divide the authoring process into selecting source files (either MPEG-2 video files or still photos for a slideshow), creating a menu system (either from scratch, via dozens of great-looking templates, or a wizard), testing the disc with on-screen simulation, and then either burning a disc or creating an ISO file.

The program has three stand-out features. The first feature is that making complex, animated menus complete with background music is a snap. Second, editing out commercials is a joy, as the editing timeline updates its thumbnails almost instantly and syncs frames to scene changes. Third, if the final output is larger than 4.7GB (the size of a single-layer DVD), the program can automatically downsample and transcode output to make everything fit on the DVD.

DVD Author Pro has some flaws. For one, it's very fussy about the format of source MPEG files, requiring either a third-party transcoder/converter or another $50 for a Tsunami-branded transcoder, which should really be included. The program also can't capture video from anything, such as FireWire video camera, so you must rely on other software at times. In addition, the program's well-written manual (a rarity these days) lacks an index.

Despite these problems, DVD Author Pro generates discs with stunning menus and video quality and is fairly easy to use, making it useful for beginners looking to step up. ▲

FTPUpdateSearcher 1.0.1



FTPUpdateSearcher
$29
FTPUpdateSearcher.com
www.ftpupdatesearcher.com

Web browsers have sprouted dozens of features recently to make interacting with Web pages simpler and faster and to let users read content offline. Overall, there's really been no comparable evolution with FTP clients. FTPUpdateSearcher is one significant exception to this rule, however, as the program offers a convenient way to keep track of changes on FTP servers, review content offline, and even maintain file listings on your own FTP server.

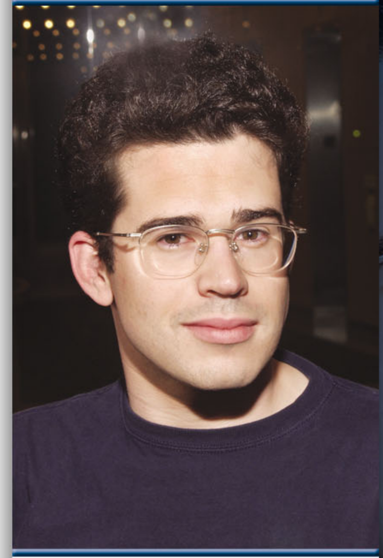
Needless to say, FTPUpdateSearcher isn't a program for everyone, as not everyone requires a detailed listing of each and every file on an FTP server or a list of files that have been added or updated since you last checked an FTP server. If this is the sort of information you need, however, FTPUpdateSearcher may have no equal.

First, you enter the addresses and login/passwords or scan an IP range for the FTP servers you want to track. You can also configure a regular schedule for the program to check those servers. Then sit back and let FTPUpdateSearcher go to work crawling through each directory, reading the details of each file, and generating a file list and log. Even when you're offline, you can browse through every scanned server, search for files or attributes, review new files, and mark files for download (either later when online or immediately). The program can also automatically upload the file listing back into a server, providing an index of files for other visitors.

There are certain niggling problems with FTPUpdateSearcher. Although it can log in to servers via SSL, it can't via SSH. On machines slower than a 1GHz, there are uncomfortable pauses between certain mouse clicks and menu choices. And for a program with so many options and preferences, there's no built-in Help. Still, if you keep track of FTP servers, there's no better option, and it will undoubtedly make your life easier. ▲

Unleash Your Inner Torrent

by Chris Pirillo



Chris Pirillo is all over the Internet. To find him go to your favorite search engine, type in his first name (which is Chris if you haven't been paying attention), and look at the first result. If it's not Chris Pirillo, your favorite search engine sucks, and you should replace it with a less-sucky search engine. You might even try a metasearch engine, such as the one Chris just released. It's found at http://gada.be, and the URL will make a lot more sense once you see that the characters translate into 4232.2233 on a cell phone. If searching isn't your cup of tea, try Chris' blog at chris.pirillo.com, Chris' tech network at Lockergnome.com, Chris' weekly radio show at TheChrisPirilloShow.com, or Chris' annual conference at Gnomedex.com.

When you bring up the RIAA in a conversation among peers (or peer-to-peers), you may notice some of them appear to freeze like a deer caught in the headlights. While it's no secret the RIAA has been strong-arming consumers by issuing lawsuits to the very people who keep it afloat, this scare tactic hasn't worked on everyone. There's a good chance you know someone still unabashedly downloading illegal content, and unless he is legally forced to do so, he'll refuse to give up the complete Jethro Tull collection he has acquired on the Internet. After all, is it really a crime to love the sound of a flute in rock music?

Thanks to the whole Napster debacle, music has previously been the exclusive focus of the file-sharing controversy, but with the recent explosion in popularity of BitTorrent, all media has come under the scrutiny of the copyright hounds. More than ever, people are trading movies, games, music, and everything else that takes up hard drive space. I've found that although a lot of techies publicly deny they download illegal content through BitTorrent, they've probably at least experimented with it. Obtaining whatever type of entertainment you want is simple, and the masses are hoarding all their favorite content in record numbers.

It's easy to give the illegal goods the most attention, but the truth is that a lot of legal torrent files are being distributed, as well. Sure, the bad may outweigh the good, but at least you have options using BitTorrent. These options apply not only to content, but also to the clients you use to obtain the content.

Azureus (azureus.sourceforge.net) has garnered a lot of attention, and it seems the client that most BitTorrent neophytes go for. The client is rather robust, and because it's written in Java, multiplatform support is implied. Conversely, because it's written in Java, Azureus tends to be a little slower than the competition (at least on Windows). There's certainly a lot going on within the utility, more than anybody could ever want or use. The abundance of features is likely overkill for those who just want to download content without the frills and thrills. In the sea of BitTorrent apps that exist, Azureus is still among the best and was my top choice for countless months.

And yes, when discussing BitTorrent clients, you almost feel obliged to include in the running the official client. The aptly-titled BitTorrent (www.bittorrent.com) may seem like something you'd want to get your hands on because it's the firstborn child of this method of data transfer, but the sad truth is that it doesn't even come close to being something that's worth your time as a power user, IMHO. While Azureus is a little bloated, BitTorrent skimps out on the features and functionality. In fact, it's so stripped down, you'll actually wish it could do more. Add the unattractive interface to the mix, and you'll see why it's a better call to rely on other solutions than it is to rely on the one from the crew that started it all. Bram Cohen: great thinker, not-so-great UI designer. So what do I recommend, instead?

There's a title out there gaining ground and fans at breakneck speed, and for good reason. uTorrent (www.utorrent.com) is poised to become the leading Windows-based BitTorrent client. It may not be cross-platform like the previous two products, but if you're running Windows, this is *the* one to get. uTorrent is small in file size but packs a massive punch. The footprint it leaves behind is tiny, so your system won't be bogged down when you're running it and downloading/uploading innumerable bits and bytes in the foreground/background. Besides being incredibly speedy, it's also ridiculously intuitive and powerful enough for the intermediate crowd. You can tell the developer really cares about the product because updates are frequent, and applying updates is fully automatic.

Obviously, nothing is perfect, but when you find a product that's easy to use, contains a bundle of worthwhile features, and is fixed and updated on a continual basis, you've found something special. Me likey.

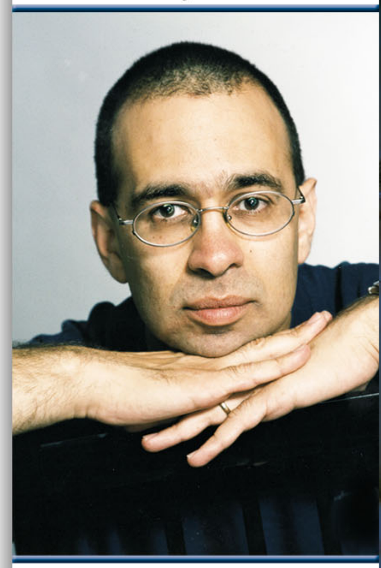
No matter what client or content you're interested in, BitTorrent represents a revolution in file distribution. Despite the fact that their work is being distributed illegally, some entertainment stars should be glad people are even showing an interest. Ben Affleck, I'm looking at you. ▲

uTorrent (www.utorrent.com) is poised to become the leading Windows-based BitTorrent client.

You can dialogue with Chris at chris@cpumag.com.

Curing The Bug-fix Blahs

by Pete Loshin



Pete Loshin, former technical editor of software reviews for Byte Magazine *(print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. Pete owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.*

Software vendors use upgrades to enhance revenue; open-source software projects use upgrades to enhance software. Open-source updates, patches, and full-blown upgrades ship whenever necessary to improve the code. There are no five-year buildups keeping your customers from trying something else. Open-source maintenance releases appear every few months and major upgrades as often as once or twice a year.

Because they are routine, open-source upgrades generate minimal hype and rarely make the magazine covers, but they do keep coming, and they're always worth checking out. Sometimes, upgrades have killer new features or fix deal-killer bugs that compel you to hit the Download button. Here are a handful of key applications that have revved recently and are well worth checking out.

Firefox 1.5 (mozilla.org). This plucky descendant of Netscape's original browser continues to kick Internet Explorer's tail on performance, safety, and features. Someday, Microsoft will catch up, maybe, but why wait? The version 1.5 out now includes many new features, but the big one (for me) is drag-and-drop tab re-ordering. I can finally shuffle tabs on the fly and put related tabs next to each other.

> This plucky descendant of Netscape's original browser continues to kick Internet Explorer's tail on performance, safety, and features. Someday, Microsoft will catch up, maybe, but why wait?

OpenOffice.org 2.0 (openoffice.org). I'm not a big office suite user, but this is a huge upgrade for OO.o. The No. 1 new feature is a new default to the OASIS OpenDocument XML format; the scores of other new and improved features mostly make OO.o more usable or more compatible with commercial office suites (in other words, Microsoft Office). Of note are presentation and Web-authoring application enhancements.

Gnome 2.12 (gnome.org). Desktop environments dictate the user experience, so when Gnome revs (every six months or so), chances are it will spice up your desktop. Gnome 2.12 (by the way, ".12" means "12th minor revision," not "second teensy bug fix of the first minor revision") includes current versions of Gnome applications, such as the Gimp, Abiword, Gnumeric, and more, but also important improvements, such as an upgraded Nautilus File Manager, new UI features, and the latest and greatest version of Evolution, the mail and groupware client. I'm drooling over new features on the sysadmin side, with new tools for designing custom menus, running system services, and managing logs.

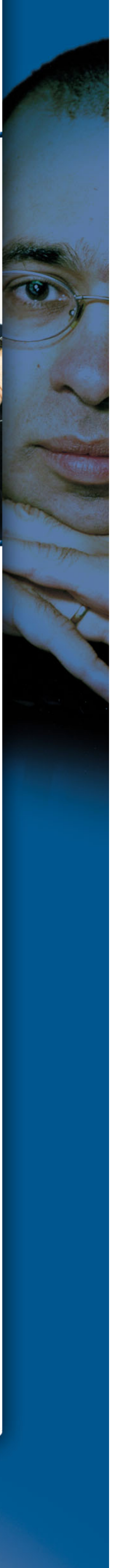
KDE 3.5 (kde.org). As the default desktop environment on many commercial Linux distros, any KDE update is important. I like it, but I'm not rushing to upgrade, yet. Other than hundreds of new features and bug fixes, there's nothing big and new forcing me to upgrade.

MySQL 5.0 (mysql.com). Millions of developers and sysadmins are more than ready for MySQL AB's latest. As a key part of the LAMP (Linux, Apache, MySQL, Perl/Python/PHP) Web-publishing platform, MySQL (pronounced "my-ess-kew-ell") is unusual in being released under two different licenses. Most users can get by with the gold-standard of freedom GPL license, but if you're building commercial applications or bundling MySQL in an appliance, the MySQL Commercial License lets you keep your code proprietary. MySQL 5.0 offers new enterprise-quality database features in an open-source database package.

Gimp 2.4 (gimp.org). This open-source graphics champion took years to reach release 2.0, but the 2.2 version still gets bug-fixed as the project progresses toward a stable 2.4 release. Gimp, like many projects, identifies development (beta) versions with odd-numbered dot release numbers (2.1, for example), or you can wait for stable releases that are designated with an even-numbered dot release number (such as 2.2). If you're willing to risk it, download version 2.3.x, and you can try the new SIOX (Simple Interactive Object Extraction) for semi-automatic pixel-accurate selection of typical foreground objects such as people, animals, or plants. Dozens of other improvements either already implemented or in the pipeline include user interface upgrades and better script integration.

If you're not interested in upgrading individual packages, you can get a good selection of up-to-date software with your favorite distribution's latest version. The new distros would be notable, too, if they weren't released so regularly. Last October we saw SUSE 10.0, Ubuntu 5.10, and Mandriva 2006. If you don't mind waiting, the application upgrades are sure to hit the next wave of distro upgrades—look for them soon. ▲

You can get saucy with Pete at pete@cpumag.com.



Search For Tomorrow

What Do Google, Yahoo! & MSN Really Want?

If you're always misplacing your car keys, someday you may be able to type **where are my keys** into your browser search box and a deft combination of RFID tagging, scanning, personalized search algorithms, and mapping will render your house layout and a pushpin icon that locates your keys. Yes there are individuals such as Suranga Chandratillake, co-founder of Blinkx, who are already contemplating such a world where search goes way beyond online documents and becomes the primary interface for accessing TV, music, and even physical objects.

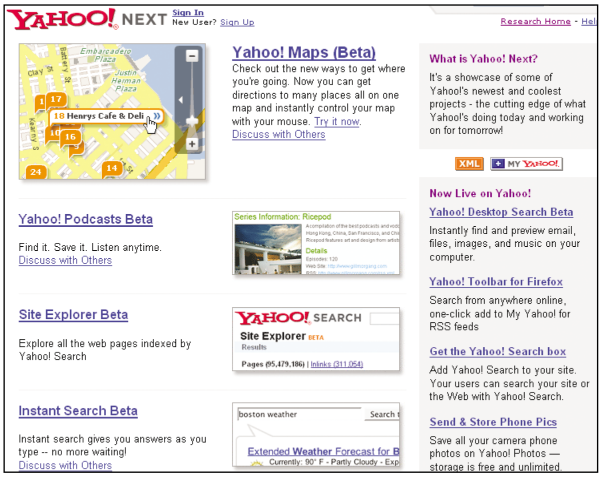
Search is more than a cool tool, says former *Wired* editor John Battelle in his book, "The Search: How Google and Its Rivals Rewrote the Rules of Business and Transformed Our Culture." We're now only in the nascent stages of a new "mechanism for how we understand ourselves," he says, and companies such as Google, MSN, and Yahoo! are eager to extend their reach everywhere we need to hunt for things. With a torrent of new and free features from the major players (desktop and mobile search, photo organizers, email, storage, video/audio search, etc.), the suspicious tech veteran may ask, what do these guys really want, and where is search-mania headed?

There are two answers: The short term goal is to gain more of our online time, so engines can serve lucrative text ads to us at every conceivable moment. Safa Rashtchy, a Piper Jaffrey senior analyst, predicts search ad spending alone will top $10 billion this year and reach $25 billion by 2010, probably more than 10% of all U.S. ad spending on all media. The longer term goal involves search spinning way beyond the browser search box to become the "de facto interface" for our lives.

Mindshare Games

For now Google and Yahoo! are the Coke and Pepsi of search, with neither booting the other from the market. The battle has shifted from market share skirmishes to a mindshare war. The buyouts, the desktop tools, the new content rollouts, and even the forays into Wi-Fi hotspots (Google) and DSL (Yahoo!), are all about widening their loops. "Integration is huge," David Berkowitz, search industry analyst and director of marketing for Viewpoint, says, so prepare for the content wars of 2006. From job listings to e-shopping, movie reviews to finding a local restaurant, the big three engines will partner with and build out services that keep their brands in *your* face and in the faces of many other established Web businesses.

For instance, the new Google Base (beta) invites everyone to post his or her own content, which seems like an innocent public bulletin board system. In fact, the Base also becomes a massive online classifieds page, for sale and job list, and P2P marketplace that are already bread and butter for newspapers, Monster.com, and eBay. Google is rumored to be working on a PayPal competitor, Google Wallet, which will let the company profit from every user-to-user and small-business transaction in the Base. This puts Google into direct competition with Amazon.com, eBay, HotJobs, and craigslist, to name a few. Because search is hands down the most successful moneymaker in Web history, the story of the next few years will be how Google, Yahoo!, and MSN (perhaps Amazon.com's A9 and AOL, too) leverage that power to absorb other kinds of digital businesses.



Yahoo! Maps (Beta)

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Now Live on Yahoo!

Yahoo! Desktop Search Beta

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Yahoo! Toolbar for Firefox

Search from anywhere online, one-click add to My Yahoo! for RSS feeds

Get the Yahoo! Search box

Add Yahoo! Search to your site. Your users can search your site or the Web with Yahoo! Search.

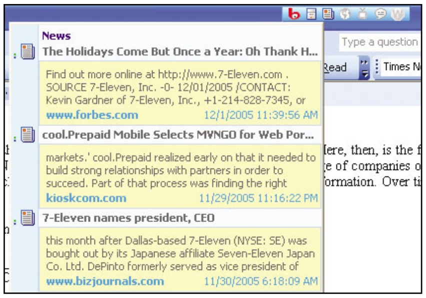
Send & Store Phone Pics

Save all your camera phone photos on Yahoo! Photos — storage is free and unlimited.

Like Google Labs, Yahoo! Next lets users peer into the near-future of search applications and betas.

Search Us

Better algorithms and more integrated content will only go so far in delivering us better results and more relevant ads, however. Most agree that ultimately search engines will need to know more about *us*. In its infancy, and controversial because it monitors usage, "behavioral search" profiles our recent queries, even our browsing and desktop activity, to personalize results in ways that the best current algorithms can't approach. The Blinkx toolbar (www.blinkx.com), for instance, does "pre-emptive search," pushing to your Desktop Web links that are relevant to whatever document or spreadsheet may be open onscreen. Call it a hands-free search.



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markets.' cool.Prepaid realized early on that it needed to build strong relationships with partners in order to succeed. Part of that process was finding the right

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7-Eleven names president, CEO

this month after Dallas-based 7-Eleven (NYSE: SE) was bought out by its Japanese affiliate Seven-Eleven Japan Co. Ltd. DePinto formerly served as vice president of

www.bizjournals.com 11/30/2005 6:18:09 AM

Blinkx scans your active window and automatically pushes relevant links from your hard drive, news feeds, or the Web to you.

Claria, formerly Gator, is researching client-based behavior tracking that makes search results more precise. By profiling the user making a search and combining that with millions of other search behaviors (collected anonymously), behavioral search won't only filter results according to your needs, but also use the search and click-through behaviors of others to bring the most valuable links to the top.

Of course, all of the preliminary Desktop tools that might track even anonymous behavior for search engines automatically raise privacy concerns. Microsoft may have been planning to acquire Claria last year with an eye toward incorporating its behavioral research into MSN Search, but negative press about Claria's adware roots seemed to end those talks. The major players need to educate and reassure the public about privacy policies before they deploy these systems and demonstrate the real value to the user.

Search Your Life

Everyone in search is focused now on multimedia and finding better ways to index and scour all of those luscious video streams and podcasts pouring through our fat broadband pipes or access the DVRs and home media servers many predict will be ubiquitous in the next few years.

In his book, Battelle paints a future of home DVRs that mesh with our online

Q&A

John Battelle:

It Knows What We Want

"My God, Google knows what our culture wants," thought John Battelle in 2001 when he first saw the search engine's Zeitgeist. In his book, "The Search," Battelle shows how this tiny upstart search company put its finger on the pulse of what people need and want and amassed tremendous power and money as a result. For Battelle, however, the quick rise of online search is more than a business success story; it embodies a major shift in economic power (toward consumer control) that also hopelessly erases former lines in the culture.

CPU: With all of the downloadable freebies and new services they offer, do the major engines really have a firm strategy for the future, or are they just spraying us with features to see what sticks?

Battelle: Both. I think with the known ways of making money (paid search, some services, CPM ads, etc.), they can afford to experiment.

CPU: You contend that online search expresses some deeper cultural shift. Can you explain this a bit?

Battelle: Sure. The core idea here is that we have access to an astounding amount of information, and to make sense of it, we need tools that go beyond the computing interface we've used since the dawn of Windows and Mac. That new interface is search. The concept of having the world's knowledge available on demand, including information that perhaps might change lives, is simply staggering. I really don't think we've thought it through, as a culture. The book is an attempt to do that, at least a start.

CPU: Until now we used taxonomies and categorization to index and access information in things such as encyclopedias and libraries. Does the search interface mark a fundamental shift in how we view what information is and what is important about it?

Battelle: It is a diametrically opposed way of approaching the problem of identifying and accessing information, and I think that is why it's so successful. Categorization is inherently nonscalable and takes a system that requires hierarchy and charts linear paths through data. It doesn't work so well for unstructured sets of data [like the Web]; solving a problem like that is nontrivial. You have to take the approach that people's implicit actions are valuable, like tagging and linking one to the other. It's an extraordinary way to find value in an unstructured data set. But it does lack the value of categorization. You can't explore within a predetermined category or a cluster if you will. There is a need for both.

CPU: If our every whim and secret desire somehow gets recorded by the search engines we use, will we need legislation to address privacy and government search of our searches?

Battelle: Yes, we probably will. That's how we deal with things here; first we worry, then a breakout case of abuse occurs, then we cover it as a national media obsession, then the lawmakers propose new rules. The American way. . . . ▲

search histories. You could search for upcoming TV programs on your TiVo via keywords, which would assemble a program recording schedule for you. But the system also would know from your online searches that you're in the market for certain goods, and it could clip into those TiVo package ads that let you click and buy on the spot. Rather than channel surf or consult a TV grid, you would assemble your own programming day, even ad packages you receive, via a search box on your TV.

But what about when those home media servers and TiVos get stuffed with even more data, such as your entire credit card history, digital photo and home video libraries, or A/V recording of your whole day? Chandratillake argues that as storage gets cheaper and recording devices ubiquitous, you'll capture and retain all aspects of your daily life, perhaps even 24/7 video records of your activities.

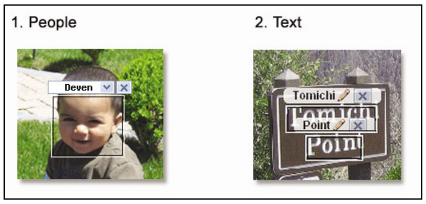
The big questions facing search involves a world way beyond keywords, where all manner of material is digitized and available for retrieval if the tools are up to it. How do you search for a video conversation you had with a colleague last year or the audio holiday greeting grandma sent the kids? Some small stealth startups are already working on facial recognition techniques to search home video and photos perhaps by physical trait.

Even the new beta video search engines at Google and Yahoo! rely primarily on old-style searching, descriptive metatags attached to video for easy keyword searches. Blinkx, which runs a BlinxTV video search, is working on next-gen technologies that use speech recognition to index the content of a clip as thoroughly as text documents. Visualization technologies can detect scene changes, so they can parse longer video into smaller, more navigable chunks on search results pages. Ultimately these approaches could perform video searches that locate and play back specific lines of dialogue or settings in a clip the same way the Google toolbar can highlight your text search terms on a particular page.

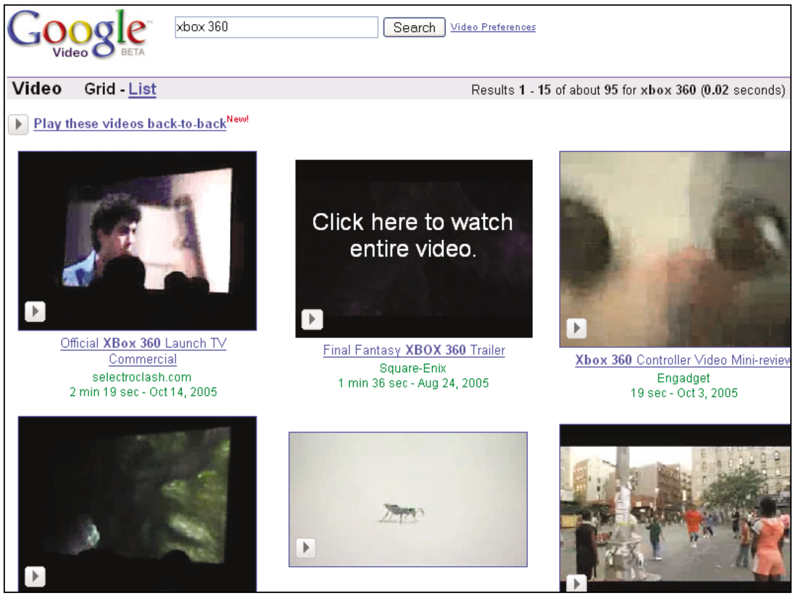
And what about those lost car keys? Well, RFID chips are just wireless metatags that can identify and locate any object in which they're embedded. As soon as these chips become ubiquitous in consumer items, then expect the Google wannabes to fire up scanning and search interfaces that also let you find your keys, that misplaced DVD, or even the stolen CD player from you car via the search box.

Therein lies the hope for enterprising techie entrepreneurs. Despite appearances, Google, Yahoo!, and MSN don't have this search game all wrapped up. Not by a long shot, says Chandratillake. Thinking *outside* the search box will lead us to indexing and tracking our life's moments, faces we've recorded, video we want to see, and even, yes, our car keys. "Searching keywords is not the same as searching your life," he says. Startups like his have loads of room to devise new algorithms and approaches that will extend the search paradigm far beyond the browser. If search is indeed the interface for an information age that is just starting, then "there are masses of problem still to be solved," he says. **CPU**

by Steve Smith



Emerging facial-recognition technology from companies such as Riya promises to index images by learning faces and reading text in images.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xbox 360

Results **1** - **15** of about **95** for **xbox 360** (**0.02** seconds)

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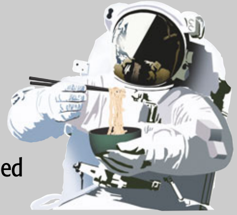
Engadget
19 sec - Oct 3, 2005

Even Google's Video search still relies on text tags.

Infinite Loop

Space Noodle



Japanese instant ramen noodle maker, Nissin Food Products, has filmed a TV commercial onboard the International Space Station. A remote-controlled, high-definition video camera filmed the commercial, which features a Russian cosmonaut peddling Cup Noodle brand instant noodles in zero gravity. No doubt, this is a momentous occasion in the storied history of instant noodle lore, and a shoe-in for an exhibit at Japan's Shin-Yokohama Ramen Museum. For more Ramen history, visit www.bento.com/phgal3.html. ▲

Source: www.boston.com/news/odd/articles/2005/09/21/noodle_maker_to_film_ad_at_space_station/ and www.bento.com/phgal3.html

Rootkit.txt

by Rob "CmdrTaco" Malda

For those of you who are not old hands with the Unix operating system, root is god. Root owns all of the files, can read anything, and can write anything. In other words, root is your system's administrator. If you are the only person who uses your machine, root also is probably you.

Now it's pretty easy to understand why a hacker would want to get root access on a machine. From this lofty position of supreme power, he could hijack the machine to do whatever mischievous or nefarious deeds he had in mind. This is why over the years hackers have developed hundreds and even thousands of ways of getting root access.

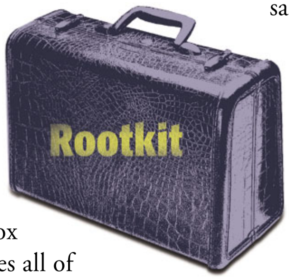
Today one of the most common methods of obtaining root is a buffer overflow. Ever since the Morris worm first ransacked the 'Net long before any of us were using it to browse eBay or Google, it exploited a mistake in the finger daemon. This exploit helped a random attacker overwrite and execute a bit of memory.

Today what is more common is something known as a rootkit. A few quick searches will give you access to hundreds of these little bundles of joy. A rootkit simply has a toolbox of known exploits and then it tries all of them. Of course, the old hole used by Morris' worm is long patched, but you'd be surprised how many systems run dated versions of Sendmail or Bind. These machines are ripe for the taking.

Once rooted, the kit replaces key files with fakes. Many of these files are carefully designed to cover their tracks, making it incredibly difficult to spot unless you are regularly doing checksums of your /bin directory hierarchy (which, not surprisingly, is what many antiviral packages do).

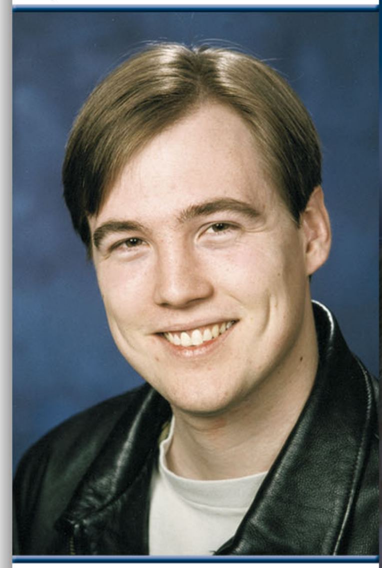
Recently Sony bundled a little bit of software joy on a bunch of audio CDs that it shipped out to the world. Sony called it DRM (digital restrictions management) software, but it installed itself without really telling the user what he was getting into. Best of all, the package made it possible for programs to run on a Windows machine, without being seen by the average user. The software didn't exploit a buffer overflow, but instead it relied on the user to execute a bit of code in order to activate the exploit. No doubt this technique was far more successful than all of those PIF files you get in your email proclaiming that they contain naked pictures of Angelina Jolie.

Once Sony's rootkit was made public, there was a mighty ruckus and ultimately a recall. Of course, the cat is out of the bag here; thousands of users installed the package, and only a very small percentage of them are likely to read sites that would alert them that their machines are now vulnerable. In the days following the announcement of Sony's rootkit, numerous proof of concept packages piggybacked on the properties of the kit. No doubt real viruses are now in the wild using this same technique.



Now all of this leads me to a few points: The first is who owns your PC; who decides what runs on it? Almost every piece of commercial software you install today has some sort of license agreement, and buried within those pages and pages of legalese, the software builders have often asked for permission to run third-party programs. In many cases these are useful additions. In other cases this is about spyware or obtrusive advertising packages. But worst of all is when these packages open up holes into your system that can and will let worm writers open backdoors in more and more systems, creating ever larger botnets that use spam and denial of service attacks to assail the world.

What are the obligations of the software vendor to be honest with its customer? Is it ethical to bury unwanted software deep within a license agreement? Even under the guise of DRM. Is the protection of a copyright really worth risking the security of millions of PCs? ▲



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

Is the protection of a copyright really worth risking the security of millions of PCs?

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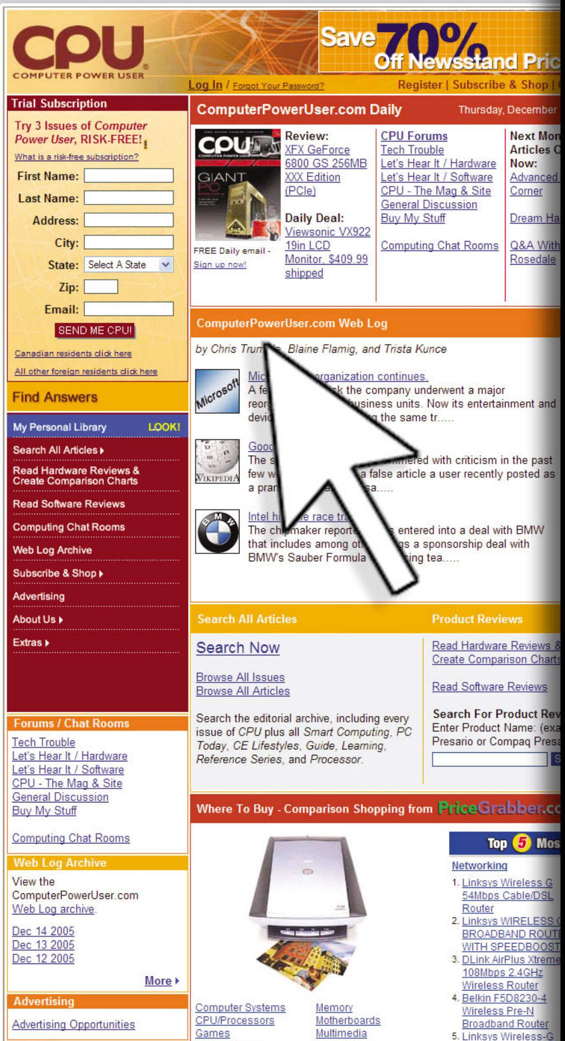

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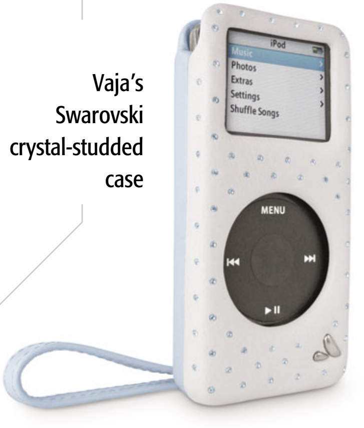
Speck Products

iSkin Duo



Vaja's Swarovski crystal-studded case

If you received a new iPod or RAZR phone for Christmas, you'll want to protect your gift with a good, stylish case. Two recent offerings for the iPod nano include a dual-layer silicone case from iSkin and a crystal-studded leather case from Vaja. The iSkin Duo ($29.99), available in several colors, is unique because it completely protects the nano, including the docking slot, headphone jack, screen, and click wheel. The Duo also includes a removable belt clip, and matching Cerulean headphones ($14.99) are available. iSkin also offers cases for the 4GB and shuffle iPods.

Vaja's Swarovski crystal-studded iVod case is for the truly fashion-conscious technophile. The case (starting at $240) is available in white, pink, red, baby blue, bronze, or black leather and has screen and click wheel protection, with the top and bottom providing access to the player's ports. A matching leather wrist strap is included.

Recent third-party cases for Motorola's RAZR include three cases from Speck Products. A see-through hard-plastic case comes in translucent red, black, or clear, and you can get all three for $29.95. A SkinTight rubberized case ($29.95) includes a belt clip and comes in pink, black or clear versions. For those with funkier tastes, the FunSkin Cloud ($29.95) case features a puffy white outer shell. ▲

Recent case covers from third-party makers can help keep your recent portable device gifts nice and shiny. The iSkin Duo adds two layers of protection to iPod nanos, Vaja's Swarovski crystal-studded case is for those who crave luxury, and Speck Products' cases will protect your Motorola RAZR.

Readerware Goes Mobile

Readerware, a media-management application for Windows and Mac computers, has now been updated to also work with iPods. (Palm OS handhelds have long supported a free Readerware companion app.) Various Readerware versions ($45 to $90) track your personal collection of books, DVD and VHS movies, or music CDs via a specialized database and wireless or tethered barcode scanner. (Readerware is offering a free CueCat scanner while supplies last; the application also works with scanners from LaserChamp, Symbol, and Metrologic.) After scanning barcodes for items in your collection, the software searches the Web for a title, author/actor/musician, cover art, pricing, and content summary. Custom options let you choose which items to include (the entire collection or subsets by category, for example), plus the information (title, author, price, publisher, etc.) you want to include. New to the app, however, is an export feature that formats book, music, and movie collections for viewing on iPods. By using a Notes feature and the iPod's click wheel, you can easily check your media inventories to prevent duplicate purchases while you're shopping. ▲

If RIM's U.S. BlackBerry business is shut down, the upcoming Palm Treo 700w smartphone may be a good alternative for users.

The End Of BlackBerry?

Those of us who live by our BlackBerrys are closely following RIM's continuing legal suit with NTP. A U.S. jury ruled in 2002 that RIM infringed on several NTP patents, and the companies have essentially been locked in settlement negotiations since. RIM is expected to file an appeal with the U.S. Supreme Court based on a Federal Circuit Court appeal in 2005. Meanwhile, a federal court injunction potentially shutting down RIM's U.S. BlackBerry business temporarily was being rumored in December, NTP reportely inked a deal with RIM competitor Visto, and Gartner reportedly suggested that enterprise clients not deploy additional BlackBerry units until the legalities are settled.

This has left analysts and users wondering what BlackBerry's future holds and what alternatives they should consider. The upcoming Palm Treo 700w smartphone is one attractive option. The device will be Palm's first Windows Mobile unit and is expected to have EV-DO support offering 400 to 700Kbps download speeds. In addition, the unit is expected to have 64MB of memory, a 240 x 240 screen, and Bluetooth. A CDMA version is expected from Verizon Wireless in January. A release for a GSM/GPRS version hasn't been announced, but Palm has stated it won't be available until later in 2006. No pricing announcements had been announced at press time. ▲

Philips Cell Phone-To-TV Chip

Those interested in watching digital television on their cell phone got some good news in mid-December when Philips Electronics announced plans to bring its TV-on-mobile chipset to North America. Philips has reportedly partnered with Crown Castle Mobile Media, which will build the network to provide services and content for mobile phones. Philips had previously introduced the chipset in Europe about four months ago, with three makers reportedly already at work developing phones for release this year.

Philips' chipset—which includes a TV tuner, decoder, and assorted components—will use technology dubbed Digital Video Broadcast-Handheld, or DVB-H. Essentially, the technology will give users a front-end to watch digital television broadcasts over the air on their cell phones for several hours before needing a recharge. Digital television on cell phones has been available in Asian markets since 2002, but it has been slower to catch on in the rest of the world. Nokia recently released the N92 handheld, the first mobile device with a DVB-H tuner built in. Look for cell phones with Philips' chipset installed sometime this year. ▲

Philips Electronics recently announced it will bring its TV-on-mobile chipset to North America. Nokia's N92 was the first mobile device to feature an integrated DVB-H tuner.

Wine & Movie Guides To Go

If you ever found yourself trying to choose the perfect wine for a meal or as a gift or you can't find anything good to watch at the rental store, Landware can help. The software developer has released updates to its mobile versions of Wine Enthusiast Guide 2006 and Leonard Maltin's 2006 Movie Guide.

Wine Enthusiast Guide 2006 ($19.95) for Palm OS and Windows Mobile devices includes reviews of about 34,000 wines from *Wine Enthusiast Magazine*, plus tools to help manage your personal wine collection, cellar inventory and buying lists, and an interactive wine knowledge course with glossary of about 1,400 terms. Leonard Maltin's 2006 Movie Guide ($19.95) for Palm OS, Pocket PC, and Windows Mobile devices includes reviews of about 21,000 movies and nearly 9,000 DVDs. Extras include movie rankings from about 100,000 people and an inventory-management system to help track your DVDs to prevent duplicate purchases.

In related news, Sprint announced in mid-December that it will begin offering full-length movie downloads for viewing on cell phones. In addition, Sprint planned to offer concerts, television shows, and more for download. MSpot is expected to provide the service, which will reportedly cost $6.95 a month for unlimited downloads. ▲

Easier TV From TiVo To Video iPod & PSP

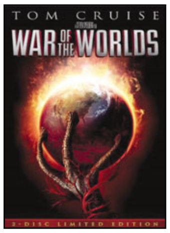
TiVo Series 2 DVR owners will soon be able to transfer TV shows to their video iPods and Sony PSPs via the TiVoToGo feature. TiVo's new Auto-Sync feature will let users essentially send TV episodes to a portable device each morning after a previous night's broadcast. Additional conversion software will be required, and TiVo has stated that a watermarking feature will identify the account that recorded the show to prevent unauthorized transfers. A small group of users will initially test the service, which is expected to be widely available as early as Q1 2006. Until now, alternatives to viewing TiVo recordings for iPod and PSP owners has meant using often difficult-to-use third-party software to convert programming before transferring it to the portable device. ▲

At Your Leisure

This month we're forgoing our usual multiplatform coverage (PC, Xbox, PS2, etc.) in order to focus the last four pages of this section on the latest entertainment product from Microsoft, the Xbox 360. Read on for our reviews of the console, seven launch titles, and a couple of accessories, then peep the release dates of a few upcoming titles.

Audio Video Corner

DVDs by Chris Trumble, CDs by Blaine A. Flamig



$39.98
Dreamworks Video
www.dreamworks.com

War Of The Worlds (Two-Disc Limited Edition)

"War of the Worlds" is one of the great, seminal works of sci-fi that touched off thousands of copycats and still has a profound affect on the genre today. With apologies to George Pal and Byron Haskin, this latest version stands head and shoulders above the classic 1953 film, and not just because of the special effects magic wrought by Industrial Light & Magic. As you'll find out in the course of viewing the Special Features disc, Spielberg took pains to avoid a number of common sci-fi pitfalls, such as aliens blowing up historical landmarks and long shots of earth's generals in underground command bunkers, dramatically planning Earth's next move. Instead, "War" focuses on the invasion's effects on one regular guy, Ray Ferrier, and his kids. The results are highly entertaining, and so is this DVD. ▲

$39.98
Paramount
www.paramount.com

Aeon Flux: The Complete Animated Collection

The original, animated "Aeon Flux" has returned in a three-disc set that includes the original MTV Liquid Television shorts, the entire run of half-hour "Aeon Flux" episodes, and some nice bonus content. This set of digitally restored episodes stands the test of time very well; Aeon's world is as enigmatic and compelling today as it was a decade or so ago. There's very little in the way of linear continuity in the show, the only constant being the love-hate relationship between Aeon and the dictatorial Trevor Goodchild. This leaves Chung and his team free to explore all sorts of ideas, which they do with obvious gusto. Chung's commentary sheds just the right amount of light on some of the more esoteric aspects of the films, despite his frequently stated hesitance to interpret them. ▲

$15
Lost Highway Records
www.ryan-adams.com

Ryan Adams—"29"

For any other artist, releasing three albums in one year would be a remarkable feat. For the ultra-prolific Ryan Adams, it seems almost passé. What is remarkable about Adams' steady output of albums is just how consistently good they are. On "29," Adams sets aside his recording and touring band The Cardinals (featured on 2005's "Jacksonville City Nights" and "Cold Roses") to turn out a group of songs more acoustic and introspective in nature. The results are mixed, but as with every Ryan Adams' album, the songs are unique and heart-on-the-sleeve honest. ▲

$27
Rhino
www.phish.com

Phish—"Live At Madison Square Garden New Year's Eve 1995"

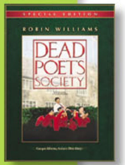
There are literally hundreds upon hundreds of live Phish shows floating around out there, but this three-disc package featuring its three entire sets from a New Year's Eve show a decade past is widely regarded among fans and band members alike as being one of Phish's finest both musically and theatrically. Featuring extended jams and several covers thrown in for good measure, Phish is at the top of its game here, and the sound is amazingly good. If you've been needing a fix of Phish or you're a fan who for some reason doesn't already own this show, pick it up immediately. ▲

See the full reviews from A/V Corner at www.cpumag.com/cpufeb06/AYL.

DVD Byte

Jan. 17

Lord Of War (Two-Disc Special Edition)



Dead Poets Society: Special Edition

Pink Floyd: Pulse

Resident Evil: Apocalypse

Jan. 24

Flightplan

Repo Man

The Aristocrats

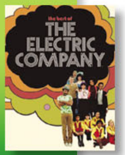
Jan. 31

Dune: Extended Edition

Tim Burton's The Corpse Bride

Gone With The Wind (Two-Disc Special Edition

Feb. 7



The Best Of The Electric Company

Doom

Evolution Arrives . . . Slowly

OK, let's try to avoid an all-out bashing of Microsoft's and Best Buy's allocation-plagued Xbox 360 debut and just focus on the machine. The Xbox 360 is slimmed down, styled up, and outfitted with gorgeous HDTV support (up to 1080i) and Dolby Digital 5.1. We've written previously about the radically redesigned PowerPC chip and ATI graphics processor fueling this platform, and we half-expected something of truly cinematic caliber. But it's not there. Characters, despite drastic advances over the last Xbox, still look like mannequins. And yet, we keep finding ourselves zooming in on cliffs and leaves and machines to marvel in their textures. Audio, however, is 100% theater quality. PC gaming parity has been achieved.

Universal Remote

Microsoft kept the new console svelte and sexy by pulling out the power supply and opting for a honkin' huge external power brick. The wireless controller is surprisingly comfortable after hours of gameplay. There's no wireless Ethernet adapter, but perhaps the high-def content of present and future needs the stable throughput of a wired connection because the 360 is also a Media Center Extender right out of the box. The 360's dashboard interface is marvelously simple. We love the display-type profiles (projector, plasma, LCD, etc.), but a preview test feature within the dashboard would help considerably.

The Xbox 360 Core System ($299) has a wired controller rather than wireless and lacks a 20GB hard drive, component HD A/V cable, or headset, all of which come in the Premium Edition ($399). Why bother? You're going to pay $99 for the hard drive upgrade anyway if only to have backward compatibility with many old Xbox titles (which, by the way, get treated to some improved antialiasing on the 360). Take the extras and buy the Premium bundle.

The first game we delved into was Perfect Dark Zero, and we kept thinking, "This looks good, but not $400 better than the first Xbox." Project Gotham Racing 3 and especially Call Of Duty 2 changed our mind. There's clearly a learning curve that developers are climbing, so expect visuals to improve gradually after the initial launch titles.

Gripes: What the heck am I going to do with my Dance Dance Revolution pads? Use them for yoga mats? As of yet, there's no adapter to bring over original Xbox controllers—grrr. We didn't experience any of the overheating problems that were publicized after launch, although both PDZ and CoD2 exhibited sporadic loading errors even fresh out of the shrink wrap. The 360 also lacks a blue laser drive, only bundling an ordinary DVD drive. With the confirmation of Blu-ray in the PlayStation 3, there are rumors that Microsoft will offer an HD DVD-equipped 360 later in 2006. Can you upgrade current models, or will doing so get you booted off Xbox Live? Nobody knows.

And, seriously, only component output for HD? Don't the Xbox people know that next-gen Windows Media DRM will support video content that only plays over DVI or HDMI? Perhaps new output cables and system updates will arrive, but we're a bit nervous today.

With three USB ports, a burgeoning Xbox Live Marketplace, and considerable media hub capabilities, the Xbox 360 looks to become far more than a top gaming console. But should you wait and see what Sony unleashes before committing the funds? Well, unless allocation improves, you may not have a choice. ▲

$399 • Microsoft • www.xbox.com

by William Van Winkle

by Chris Trumble

Two Heads

It's true that Microsoft's launch strategy is baffling at best, and William makes some valid points about cabling issues (although I'm not quite as worried as he about plugging in an old DDR pad; if I want exercise—and I don't—I'll go upstairs for a sandwich), but these things aside I've been very impressed with the Xbox 360 so far. Yes, we still have a ways to go before human characters in video games are convincingly human, but character models in Perfect Dark, Call Of Duty 2, and especially Condemned are clearly an improvement over the best the first Xbox had to offer, and this is just first-gen software. The real wow factor in this first round of titles comes in the form of improved textures for inanimate objects. True, high-end PCs have been doing this stuff for a while now, but for a console to crank out the kind of environments you'll see in the aforementioned launch titles or the sort of car models you'll see in PGR3 and Ridge Racer 6 is very impressive. Especially when you consider that at $400 it costs less than a high-end video card.

One of my favorite things about Xbox 360, though, is the new wireless control pad. This pad is extremely comfortable, highly functional, and lets you turn the console on and off remotely. Basically, it incorporates pretty much everything I'd add if I were designing my own non-keyboard-and-mouse controller. ▲

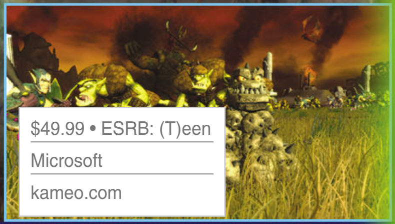
Kameo Elements of Power

The Ubiquitous Platformer

Funny how there always seems to be a platform game with every new console launch. Xbox 360 is apparently no different. You play the fairy wing-clad Kameo, a slender Elfin female whose family has been kidnapped by the troll king (Thorn) and Kameo's own traitorous sister, Kalus. As the game begins, Kameo loses all of her powers and the ensuing game takes you on a quest to regain what you once had. You'll travel to different zones as you endeavor to regain the elemental spirits of 10 warriors. Each time you regain a spirit, you'll gain a new morphing ability belonging to the realm of plant, water, rock, fire, and ice. Your newly gained abilities will come to good use in combat and as you work through the puzzles.

At the outset you may roll your eyes at the fantasy clichés and a poorly thought-out entry into the game. The appealing graphics and cute character will bring you around, though, and things improve once you delve past the first couple of hours. Kameo has quite a few gameplay subtleties, but there's often no compelling reason to exploit them, which in turn creates an environment that can feel repetitive. The game's co-op play feels like an afterthought.

Kameo is a good family-friendly pick that won't challenge The Legend Of Zelda for top action-RPG honors, but is entertaining and showcases the Xbox 360's assets. ▲



$49.99 • ESRB: (T)een
Microsoft
kameo.com

PERFECT DARK ZERO

Rare Is Back

There were some who questioned Microsoft's much-ballyhooed acquisition of developer Rare after the 2003 release of Grabbed By The Ghoulies, and we have to admit that we were among them. But the company that brought us GoldenEye 007, by far the best FPS on the Nintendo 64, has staged a mighty comeback in Perfect Dark Zero, the Xbox 360 prequel to the second-best N64 FPS, Perfect Dark.

PDZ looks fantastic; we spent considerable amounts of time in the game just walking around and staring at the texture of mundane items such as brick and concrete walls, iron railings, and wooden windowsills, not to mention the elaborate models of the game's weapons. To find such a wealth of detail and to have it so crystal clear on a game console is a welcome change from the days of up-close jaggies and, even worse, items with no detail at all. Character models look pretty darn good, too, and when you combine PDZ's good looks with tight, smooth controls and razor-sharp sound, you're left with an experience that definitely bodes well for what's to come on the 360. ▲

$49.99 • ESRB: (M)ature
Microsoft Game Studios
www.perfectdarkzero.com

PGR PROJECT GOTHAM RACING 3

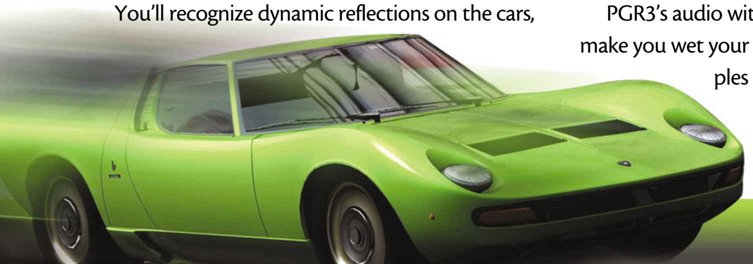
Next-Gen Racing

As an early Xbox 360 entrant, PGR3 takes the pole position when compared to other racing-themed launch titles. Visually the game is outstanding (more so on a high-def TV). The graphic detail borders on being ridiculously good: You'll recognize dynamic reflections on the cars, see spectators leaping out of harm's way, and get déjà vu from the backgrounds if you've been to Nuburgring, Las Vegas, London, NYC, and/or Tokyo. Not to mention the gorgeous in-cockpit views that help suspend disbelief.

PGR3's audio with a decent 5.1 system will make you wet your pants, thanks to audio samples from the real cars. Driving leans toward realistic, but is forgiving. You have a choice of 80 dream cars: Ferrari, Callaway, McLaren, Saleen, Lamborghini, TVR, and much more. There are fewer total cars than in PGR2, but these are all screamers—you don't have to drive a beater to get to the good stuff.

At the end of the day, PGR3 is quite similar to PGR2 but with an incredible step up in realism. The game is a joy to play; kudos to developer Bizarre Creations. ▲

$49.99 • ESRB: (E)veryone
Microsoft
www.projectgothamracing3.com



CALL OF DUTY 2

Give The PC A Run For Its Money

$49.99 • ESRB: (T)een
Activision
www.callofduty.com/cod2

It's not often a console gives the venerable PC a run for the money, but that's exactly what Call Of Duty 2 on the Xbox 360 managed to pull off. Playing the game on the 360 impressed us immensely and, like PGR3, visually showcased the machine's prowess.

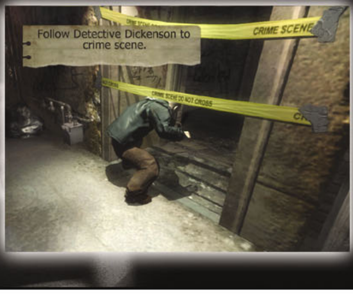
The game will be immediately familiar to anyone who's played the PC version. This iteration is tweaked for the awesome 360 controller and handles very accurately. Those with HD and 5.1 won't even miss the PC, which is incredible when you consider how good the game looks and sounds running on a $300 console. To get similar results on a PC, you'd have to spend far more than the cost of a Core Edition 360.

The detail, special effects, and audio make the CoD2 experience intense. There really hasn't been another game out that gives you such a feeling of battlefield integration. Graphics and audio are not the only reasons behind this; the intelligent AI from the PC release returns to make a soldier's life hell.

The single-player game is worth the cost of admission for anyone that hasn't completed CoD2 on a high-end PC. The multiplayer game seems a bit rushed and less polished (where's the lobby where we can hang out after a game?), but is passable. Perfect Dark Zero is a good release, but CoD2 one-ups it in the FPS genre. ▲

CONDEMNED: CRIMINAL ORIGINS

$59.99 • ESRB: (M)ature
Sega
www.condemnedgame.com

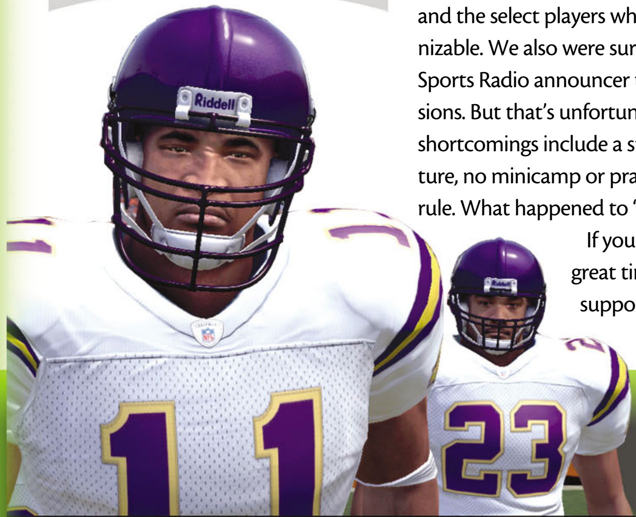


We were intrigued when Sega showed off an early build of Condemned almost a year ago at last year's E3, and the finished product is even more impressive. In fact, it's not a stretch to say that Sega and developer Monolith have put together the best-looking title of the launch. Playing the game on a big screen with the appropriate sound setup is about as close to being there as you can get in a video game.

Of course, good looks aren't everything, but Condemned delivers in pretty much every other area, as well. It controls well, sounds great, offers up brutal and engaging combat, and ties everything together with a dark, gritty, Max Payne-esque story that keeps things interesting.

There are a few bones we have to pick; we would have liked less handholding when searching for forensic evidence, we got stuck once when the game let us walk into a cranny where we weren't supposed to go and couldn't get out, and a little more variety would have been nice. But if you're into survival-horror games and like first-person action, Condemned is as good as it gets. ▲

MADDEN NFL 06



$59.99 • ESRB: (E)verybody
EA Sports
www.easports.com/madden06

We've given Madden NFL games high marks every year we've reviewed them, and there's really a lot to like about this latest version, too, but in some ways it doesn't even measure up to Madden 06 on current-gen platforms.

Madden for 360 is a graphical tour de force; in-game player models compare favorably to the pre-rendered players shown in between plays on Xbox and PS2, and the select players who received custom facial mapping are instantly recognizable. We also were surprised to find after a while that we prefer the new EA Sports Radio announcer to the Michaels and Madden voice track in other versions. But that's unfortunately where the 360 version's superiority ends. Its shortcomings include a stripped-down franchise mode, no create-a-player feature, no minicamp or practice modes, and most grievous of all, no instant replay rule. What happened to "If it's in the game, it's in the game"?

If you just want to play a game of football, Madden 360 is a great time (unless you want to challenge a play), and online support is solid. But if you're become attached to the series' deeper play modes, you might be disappointed. ▲

RIDGE RACER 6

$59.99 • ESRB: (E)veryone • Namco
www.namco.com/games/ridgeracer6

Namco's Ridge Racer arcade-style racing games have sort of been leading-edge graphics demos for a number of video game systems, starting with the first Ridge Racer, which appeared the same day as the original PlayStation in the United States. By 1995 standards, that game was more than just a graphics upgrade, it was more like a paradigm shift that helped solidify the move from 2D games to 3D. Ridge Racer 6 probably isn't quite as huge a leap in graphics technology as that was, but if you want to see what the Xbox 360's silicon can do at high speeds, this game will show you.

Whereas Project Gotham Racing 3 works to provide a realistic driving experience with authentic physics and handling, RR6 is all about speed and style. Cars don't model damage, and instead of crashing you mostly just come to an abrupt stop when you hit walls, etc. The key to success in RR6 is drifting, or cornering in such an extreme way that your tires break lose and you slide through corners horizontally so you can accelerate immediately as you clear them. Drifting earns you another important tool, nitrous boosts.

The game serves up numerous tracks and cars, most of which are locked at the outset, and comes with full Xbox Live support, so arcade racer fans have plenty to look forward to. ▲

Logitech Harmony Advanced Universal Remote For Xbox 360

Good Looks & Terrific Functionality

Microsoft wants the 360 to be more than just a game machine; the goal is to have a game machine that takes over as your central hub to listen to digital music, watch movies, view photos, and more. There's a good reason for Microsoft bundling a mini remote with initial packages of the Premium 360 and selling a nicer, though generic-looking, retail version, as well ($29.99). But those remotes now face competition from Logitech's new Harmony remote for the Xbox 360. At $129.99 the Harmony 360 is Anna Kournikova to Microsoft's Helena Bonham Carter—classy and fine but in a different league. The Harmony 360 borrows from the Logitech Harmony 880 reviewed (4.5 CPUs) in the September 2005 issue (page 91). For instance, plug it into your PC with the included USB cable and easily set up macros to turn on or off the appropriate gear in your gaming zone. If you want only the best for your new Xbox 360, look no further. ▲

$129.99 • Logitech • www.logitech.com/harmony

Turtle Beach Ear Force AXT Headphones

A Must-Have For Decibel Deficit

Maybe you're in an apartment or have to keep the volume down while others sleep. Headphones are the obvious option, but going from 5.1 in your living room to cramped stereo on an Xbox 360 is illegal in 14 states—or should be. Zalman's ZM-RS6F surround headphones left a bland taste in our mouth awhile back, but Turtle Beach's AXT is a whole new and much improved beast. No, it's not Dolby Digital by any stretch; with the center channel divided to each ear, forward-facing sounds still have a left-and-right plane feel to them. But the rear channels are surprisingly convincing and deliver far better spatial separation than Zalman's set. After a few minutes, especially when distracted by gameplay, your brain tends to use visual cues to fill in the fronts and yield an even better experience. With eight drivers, the AXTs can get heavy and warm. Still, this is the best gaming headset we've seen yet, and it's essential for getting immersed when you can't get loud. ▲

$79.95 • Turtle Beach • www.turtlebeach.com

Coming Attractions

Microsoft did a nice job of making sure a good selection of quality games were available at launch, but that's only the beginning. Here are some of the highlights on the upcoming release list (vendor release dates are subject to change):

Dead Or Alive 4 (Tecmo, Fighting):	**Dec 28**
Lost Odyssey (Microsoft, RPG):	**Jan 2**
College Hoops 2K6 (2K, Sports):	**Jan 23**
[eM] –eNCHANT arM- (From Software, RPG):	**Feb 1**
Blue Dragon (Microsoft, RPG):	**Feb 1**
Huxley (Webzen, MMOFPS):	**Feb 1**
Saint's Row (THQ, Action):	**Feb 2**
Frame City Killer (Namco, Action-Adventure):	**Feb 7**
Fight Night: Round 3 (EA, Sports):	**Feb 14**
Full Auto (Sega, Racing-Action):	**Feb 21**
Battlefield 2: Modern Combat (EA, Tactical Shooter):	**Mar 1**
Burnout: Revenge (EA, Racing-Action):	**Mar 1**
Gears Of War (Microsoft, Shooter):	**Mar 1**
Tom Clancy's Ghost Recon: Advanced War Fighter (Ubisoft, Tactical Shooter):	**Mar 1**
Elder Scrolls IV: Oblivion (2K Games, RPG):	**Mar 20**
Chromehounds (Sega, Action):	**May 1**
Dead Rising (Capcom, Action):	**May 1**
Halo 3 (Microsoft, FPS):	**TBA**

Software Tips & Projects

DVDs Gone Wild (Part 1)

So you got that new DVD burner for Christmas, and you've just about finished transferring old videos and hard drive backups to the spacious format. Now it's time to teach your DVDs new tricks. With artful editing tools, DVDs can accommodate multiple types of media, not just film. You can play back on your home theater everything from a PowerPoint presentation to narrated slideshows with effects that put PC slideshow editors to shame. By drilling into Roxio's newest suite, Easy Media Creator 8, we even found ways to pack a huge music collection onto a 4.7GB disc that plays back on our TV. Fire up the burner, Spielberg; there's a lot more than movies playing on your DVD.

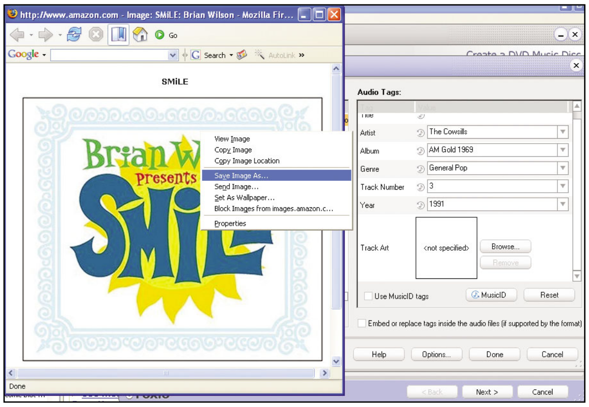
A Music Library With Menus

With Roxio's Easy Media Creator 8, you can create a music disc for your DVD player that includes album art, menus, and on-screen music descriptors with the DVD Music Assistant. Launch the program, click File, and select New Project, Audio, and Create DVD Music Disc. This will bring up the DVD Music Assistant window. In the Disc Name field, name your project. Click the Add Tracks button, highlight the files you want to import from your directory of music files, and click OK.

Once you have imported all of your tracks into the program, highlight all of them, right-click, and select Edit Audio Tags from the pop-up menu. Check the Use MusicID Tags box in the Audio Tags window and click the MusicID button. The program accesses an online database and imports complete ID info for every song in a uniform way. Finally, click Done.

You may already have low-res album art attached to a song in your library. For better visual fidelity on a TV, however, or just to fill in missing art, we used Amazon.com to find a medium-res version of a song's album art. Right-click the album's art you found online and click Save Picture As to save the image. Back in DVD Music Assistant, highlight one or more tracks to which you want to apply this image, right-click, and select Edit Audio Tags from the pop-up menu. In the Track Art section, click the Browse button to find the new album art, select the image, and click OK to import it into the DVD. Click Done.

Click Next to advance to the media-editing screen. By checking various Smart Menu boxes, you can add main-screen menu items that let you browse your collection by year, genre, artist, etc. You can also click Select Style or Add Background image to customize the main menu. From here, click Next to burn or save your project. Ambitious DVD editors, however, may want to click the Edit In Music Disc Creator. This transfers the project to a more robust editor that drills into the DVD menu directories and tweaks the naming conventions and image backgrounds. After you click the Switch Now button, you'll notice that the background image you established for the DVD's main menu is repeated as the general background in submenus (indexes for Tracks and Artists, etc.), as well as the background screen for the individual tracks you imported. However, you can change any of these backgrounds. In the directory tree on the right, right-click any of the Track Lists or Smart Menus items and choose the Smart Objects command to customize these submenus. The Image button can import a specific background, the Overlay button adds black bars as background for navigation buttons, and the Navigation area lets


http://www.amazon.com - Image: SMiLE: Brian Wilson - Mozilla Fir...

Audio Tags:

Artist: The Cowsills
Album: AM Gold 1969
Genre: General Pop
Track Number: 3
Year: 1991
Track Art: <not specified>

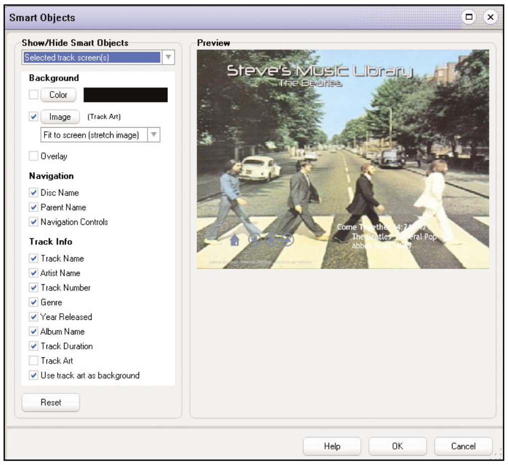
☐ Use MusicID tags

☐ Embed or replace tags inside the audio files (if supported by the format)

Swipe medium-res album art from Amazon.com and turn it into background images for playing music on your TV.

WinXP Tip Of The Month

You used to be able to boot straight into Windows without a logon box roadblock (often with a username and no password). Now the logon box is back. The reason may be that Microsoft .NET Framework has installed a second account on your PC, which often forces the logon screen to appear again for the default user. Remedy this by clicking Start, Run, and typing **control userpasswords2** in the Open field. In the User Accounts window, highlight the default user account and uncheck the box over the list labeled User Must Enter A User Name And Password To Use The Computer. When you click the Apply button, the Automatic Logon window pops up to ask for your username and password, which it will keep stored to apply automatically at bootup. ▲


Smart Objects

Show/Hide Smart Objects: Selected track screen(s)

Background
☐ Color
☑ Image (Track Art)
Fit to screen (stretch image)
☐ Overlay

Navigation
☑ Disc Name
☑ Parent Name
☑ Navigation Controls

Track Info
☑ Track Name
☑ Artist Name
☑ Track Number
☑ Genre
☑ Year Released
☑ Album Name
☑ Track Duration
☐ Track Art
☑ Use track art as background

You can customize the way music title listings appear on your made-for-TV music DVD.

you remove specific items from that submenu screen. Click OK to return to the Music Disc Creator window.

If you imported album art to your project, then you can use that cover as a full-screen background for the respective track. In the directory tree under Smart Menus, choose a specific Album to see the individual tracks for the album listed in the small window to the right above the DVD preview screen. Highlight all of the tracks for the album in this screen, right-click the tracks, and select Smart Objects from the pop-up menu. In the Background section, check the box next to Image to find the album art you saved and click OK to import it as the background for every song screen of that album. By unchecking boxes in the Navigation and Track Info boxes, you can clean up the appearance of the screen that appears as your song plays. Better still, turn the album art into a full-screen background by unchecking the Track Art box and checking Use Track Art As Background, which fills the screen with the album art you saved. Lastly, click OK.

Once you're done tinkering, click the Burn button to make a DVD. The music is transcoded into AC-3 format, which is relatively rich and detailed on most home theaters. You'll be able to navigate an entire music library from your TV by artist, year, song, and so on.

DVD Slideshows

Running slideshows from a DVD may seem like a hopelessly retro use of advanced technology. But until media servers and home networking pipes our photo collection to a TV set, burning images onto a DVD is an efficient way to archive a massive image library to a navigable form that you and relatives can play easily.

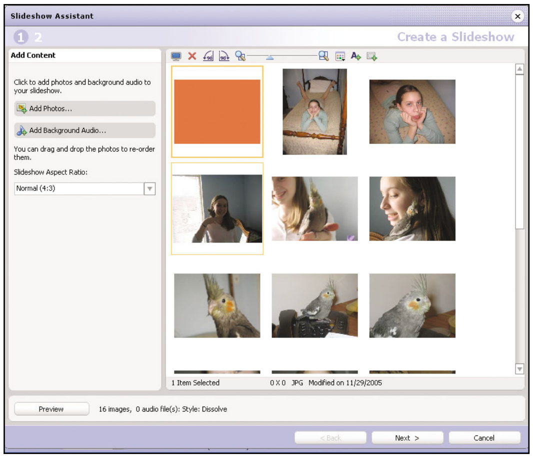
There are ways to convert slideshow presentations from Movie Maker 2 and Photo Story 3 onto DVDs, but we felt that MyDVD gave us more design flexibility and retained the resolution and sharpness of our original digital images.

Start MyDVD and click Add Slideshow to bring up the Slideshow Assistant. Click Add Photos to import your images. Next month we'll get into more advanced DVD slideshow editing involving custom narration and video effects, but we'll just focus on some cool and easy additions this month.

For instance, you can add captioning by highlighting any slide and clicking the Add/Edit Text On Slide button (the button looks like an "A+"). Next you'll see an enlarged version of the slide and a movable text-entry window that overlays the slide. Type in your caption and click OK. Back in the main window, click the Next button to adjust slide duration times and transition effects. Click Finish to complete your slideshow. MyDVD adds this collection of images to the main menu as a new branch.

Use the Add Slideshow button in MyDVD to parse your photo collection into separate DVD menu items and convert literally hundreds of images from your PC into a navigable DVD archive that will play on a TV. So the last step is to use the Burn button on the main MyDVD screen to start the DVD writing process. CPU

by Steve Smith


Slideshow Assistant

Create a Slideshow

Add Content

Click to add photos and background audio to your slideshow.

You can drag and drop the photos to re-order them.

Slideshow Aspect Ratio: Normal (4:3)

1 Item Selected   0 X 0 JPG Modified on 11/29/2005

16 images, 0 audio file(s): Style: Dissolve

Use MyDVD to pour gigabytes of digital still photos onto a DVD for large-screen playback on any standalone DVD device.

Registry Tweak Of The Month

To eliminate files permanently when you delete them, first click Start, Run, type **Regedit** in the Open field, and click OK. Next right-click the HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER key and select New and DWORD Value. Name the Value NoRecycleFiles and double-click the value to change the Value Data to 1. Lastly, reboot. ▲

Infinite Loop

Digital Idiots

Digital cameras are good for capturing those unforgettable moments. As Anthony Prince and Luke Carroll quickly learned, however, taking digital pictures of yourself holding $130,000 in stolen moolah may come back to bite you. The two amateur thieves were sentenced to between four and five years in prison for holding up the Vail, Colo., WestStar bank. Even worse is the fact that they'll have to live the rest of their lives knowing that photos of them, grinning from ear to ear, are on the Internet for all to see. ▲

Source: www.smh.com.au/articles/2005/10/22/1129775984780.html

Warm Up To Penguins

Introducing OpenOffice.org Base, Part II

Last month (page 94) we discussed ways to open a new or existing document in OpenOffice.org Base, the database front-end in OpenOffice.org 2.0. With an actual document open, you're ready to run queries, create and modify tables, or edit existing data. This month we'll focus on accomplishing such tasks. Because there are so many tasks possible, however, we'll focus on one specific action in each of the following sections.

Protect Data From Changes

If you're working with data you don't want altered, check that read-only access is enabled; look for Read-only text in the OpenOffice.org Base title bar. If you're accessing the data over a network, you may not have read-write permission. If not, you're safe because you won't be able to make changes. If you do have read-write permissions, you need to open the tables instead of just running queries. Once you have a table open, you can click Edit to disable the ability to make changes. You can tell if changes are disabled by checking if there's an additional empty row at the bottom of the table.

Create A Table

You can create a table manually or by using a wizard. Either way start by clicking the Tables icon in the left-hand Database pane. In the Tasks pane, the two options of interest are Use Wizard To Create Table and Create Table In Design View, which lets you create a table manually (Figure 1). Because there are many commonly used tables, we'll focus on the wizard option (Figure 2).

When using the wizard, you will first choose if you want to set up a Business or Personal table. Don't worry about the distinction too much; this is just a method for separating tables into categories. It's possible you'll have databases for both categories. If you aren't sure which category to use, try both. You can view the types of tables the wizard provides by using the Sample Tables menu; the contents that display will change according to which radio button you select.

These samples are just templates, though. For example, let's say you want to create a table that logs various aspects of your exercise habits. Here you would click the Personal radio button and then choose ExerciseLog in Sample Tables. The table hasn't been created yet, though. We have just chosen a template, and within this template are fields we can select that are commonly used in this type of table. One useful technique is to start by choosing all the fields by clicking the button that looks like double forward arrows (>>). You can then remove fields you don't want by selecting the fields individually and clicking the back arrow (<). In our example we'll remove PersonID and HoursSleep and keep the rest.

Once you have the fields you want displayed on the right, you can reorder them by selecting a field and using the Up and Down arrow buttons to move it. Typically, you'll want to order the fields so they make logical sense when you're filling in the database. When you're finish ordering, click Next to proceed to the Set Types And Formats dialog box (Figure 3). Here you'll see your fields on the left and the settings for a selected field on the right.

As an example, let's walk through defining the LogID field. In the Field Name line, you can change the name LogID to something more preferable, such as EntryNumber. In the Field Type menu, the Integer option is a good selection, as this field is typically going to contain 1, 2, 3, etc. The Integer types that will be available will

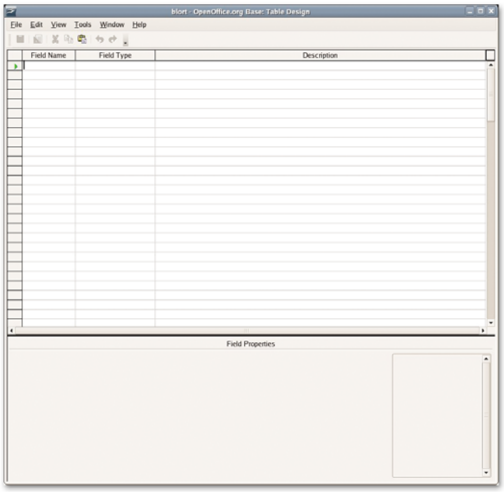
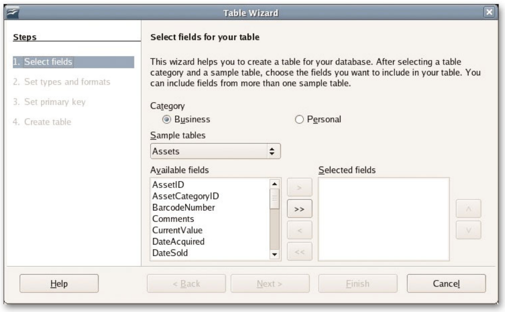


Figure 1. The OpenOffice.org Base Table Design window is where you can individually enter and define fields.



This wizard helps you to create a table for your database. After selecting a table category and a sample table, choose the fields you want to include in your table. You can include fields from more than one sample table.

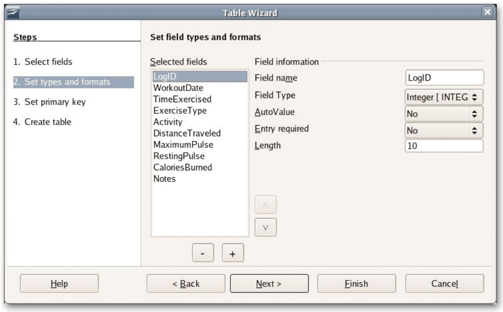
Category
● Business ○ Personal

Sample tables: Assets

Available fields:
AssetID
AssetCategoryID
BarcodeNumber
Comments
CurrentValue
DateAcquired
DateSold

Selected fields

Figure 2. The OOo Base Table Wizard can help you quickly create commonly used Business and Personal tables.



Set field types and formats

Selected fields: LogID, WorkoutDate, TimeExercised, ExerciseType, Activity, DistanceTraveled, MaximumPulse, RestingPulse, CaloriesBurned, Notes

Field information
Field name: LogID
Field Type: Integer [INTEG
AutoValue: No
Entry required: No
Length: 10

Figure 3. You'll define exactly what your fields should contain using the Set Types And Formats option in Base's Table Wizard.

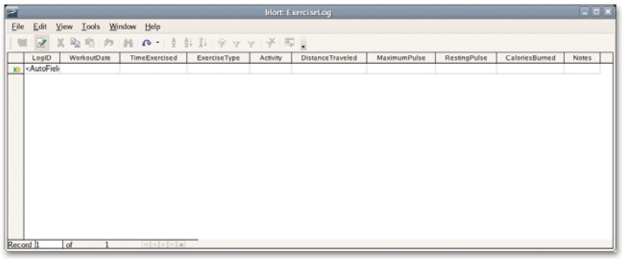
depend on the database type you're using. If you're unsure of a particular type, look in the database's official documentation or do a Web search on the type name (such as small integer SMALLINT) and the database type (such as MySQL).

After choosing the type, you'll decide if the field should be assigned an automatic value using the AutoValue drop-down menu. If you select Yes, the next item is the Auto-increment Statement. Here the default is IDENTITY, which will generate a unique value for each row in the table. If you selected No, the next option is Entry Required. If you answer No, you can leave the field blank. Answering Yes means you can't. For example, if you answer Yes, you may have to leave junk entries in fields just because you're required to make entries.

The last option is the Length field, which specifies how many characters or digits the field can contain. Here, it's better to make the value larger than needed rather than play it too conservatively. This is particularly true for text fields. If you're typically verbose, make the field large enough for everything you might want to enter. Click Next to finish setting up the fields.

You'll now see the Set Primary Key dialog box. A primary key is data that is guaranteed to be unique for each entry, such as an Ethernet card's unique address. Generally, it's a good idea to create a primary key, although you can automatically have one generated. (Choose Automatically Add A Primary Key and check the Auto Value checkbox.) You can also use a field that you trust will always contain a unique value (select Use An Existing Field As Primary Key and then select the actual field) or use a combination of fields to generate the key (select Define Primary Key As Combination Of Several Fields). Overall, it's up to you if you want to automatically choose a unique ID or something else. Just remember, the ID needs to be unique, so if you don't have a unique field, use a combination of fields or use auto values.

Clicking Next will take you to the Create Table dialog box where you can name the table, enter data, alter the table, or create a form based on the table. If you chose to insert the date, the table will appear as shown in Figure 4.



LogID	WorkoutDate	TimeExercised	ExerciseType	Activity	DistanceTraveled	MaximumPulse	RestingPulse	CaloriesBurned	Notes
<AutoFiel									

Record 1 of 1

Figure 4. This illustration shows our example table window with the fields ready to fill in.

Add & Change Data

Entering data in a table is generally as easy as clicking in a field and typing. If you don't have a table open, click the Tables button and in the Tables pane double-click the table to work with it. You may have to expand the window to make it wide enough to see all the fields at once. To change the values once they're entered, click in the field and make the changes just as you would in a word processor app or spreadsheet. To the right of the Tables pane, you can click the Document arrow to preview the table's contents in the actual pane.

Additional Tasks

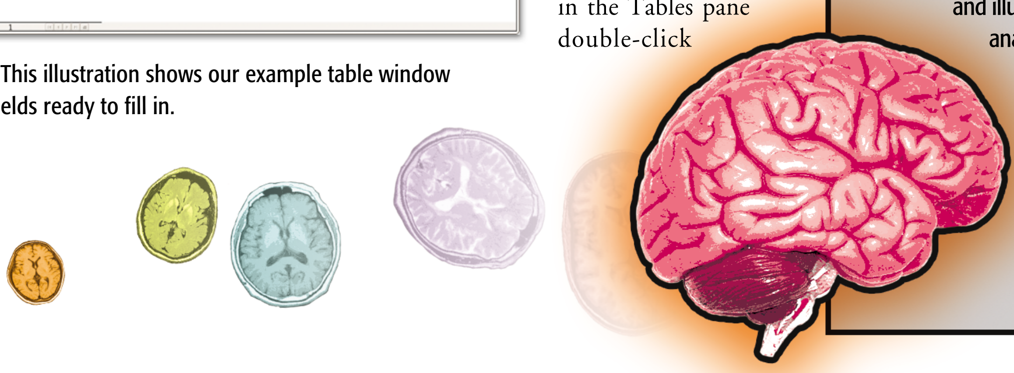
You can also run SQL queries via the Queries icon in the Database pane, create forms via the Forms icon, and run reports via the Reports icon. Each of these functions has a wizard for assistance if you aren't used to working with SQL or other arcane features. We could easily spend an entire article on each of these tools, so take your time exploring them to become more familiar. If you are experienced with working with databases using GUI tools, you'll probably find these options easier to navigate. For more assistance, you can turn the OpenOffice.org Forum (www.oooforum.org) for assistance. CPU

by Dee-Ann LeBlanc

Infinite Loop

Hot Brains

The University of Illinois Urbana-Champaign is selling a 2006 calendar that features models wearing even less than those in *Sports Illustrated's* swimsuit issue. But you won't find swimsuits in this calendar—or skin and bones for that matter. Try gray matter. The 2006 "Big Brains" calendar features 12 brain scans of campus administrators, faculty, staff, and students. The MRI photos are "artistically enhanced" and illustrate the brain's anatomy, blood vessels, connections between different areas, and brain activity during different tasks. Check out the hippocampus on February. ▲



www.newsday.com/news/nationworld/wire/sns-ap-brainy-calendar,0,6798967.story?coll=sns-ap-nationworld-headlines Source: AP

Shavings From The Rumour Mill

AMD A Victim Of Its Own Success

by Mike Magee

I've always had a heap of sympathy for firms that have factories. Making things, whether they're socks or semiconductors, isn't the easiest thing to do. And if your semiconductors suddenly start selling like hotcakes and your factory is full to capacity, your customers get cross.

That appears to be what's happening at AMD. Just a few weeks ago, we went to the opening of Fabrication Plant 36 in Dresden, Germany. This factory will start churning out chips using 65nm technology during this year. Because it makes these chips using 12-inch silicon wafers, it will be able to supply demand.

Experts say that the worldwide chip industry is worth more than $250 billion, and the extraordinary thing is that fabrication plants cost the chip firms more than $2 billion each to build. That's a lot of money in anyone's book, and we have to remember that it's all essentially an act of faith that people will continue to buy the microprocessors and pay enough money for AMD and Intel to carry on their businesses. Because both of these firms have factories, the overhead in terms of personnel is incredible—at the last count, AMD had 13,000 people working for it and Intel 85,000.

AMD had a very successful 2005 and gained significant market share against Intel, almost for the first time in living memory. People want its chips because in general terms right now they're better performers than Intel's. That's not to say that situation is going to persist forever. Intel likes nothing better than having its back against the wall; it is an aggressive company with a will to win. So by the time you read this, it will already have launched—to great fanfare—its Yonah "Core" processors and its consumer reference platform, dubbed Viiv (which rhymes with "five").

There's more to come. As readers of *CPU* magazine exclusively knew back in 2004, the Pentium 4 architecture is barely breathing, and Intel has some super microprocessors coming later this year. Code-named Merom, they will not only use advanced tiny wires built on 12-inch silicon wafers, but they will also include some technology that will allow them to outperform anything AMD can currently offer. While Merom is currently slated to appear at the end of 2006, it's my view that behind the scenes Intel will move to accelerate the launch by several months and has the technology and will to do so.

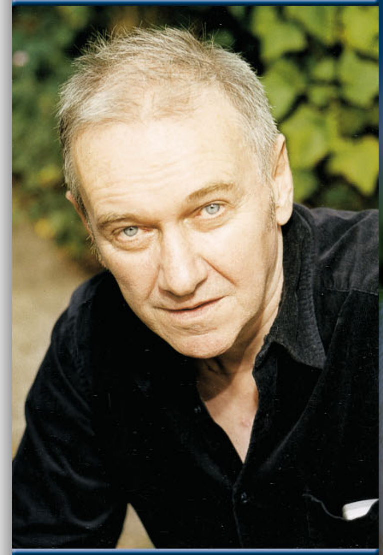
Intel will also use Pentium 4 microprocessors in Viiv machines, but if you are serious about your home computing, we'd advise you to avoid these because the notebook processors, the successors to the Pentium M, are going to be so much better in terms of heat dissipation and performance. I have argued here in the past that Intel should have used Pentium Ms for desktops the same year it launched Pentium Ms for notebooks, but that was never going to happen because its factories were way too busy churning out the NetBurst architecture Pentium 4s. The Pentium 4 architecture has paid for itself now many times over, and it certainly is time for Intel to move on up.

Of course, AMD is not going to stand aside and let the bigger company race away with the lead. AMD is also developing future tech, which it's keeping very quiet about, but is likely to match anything Intel will launch. But Intel continues to be a very profitable company, has a huge amount of cash in the bank, and continues to refit and re-engineer its factories so that it's never going to suffer anything like the demand restraints AMD suffers from.

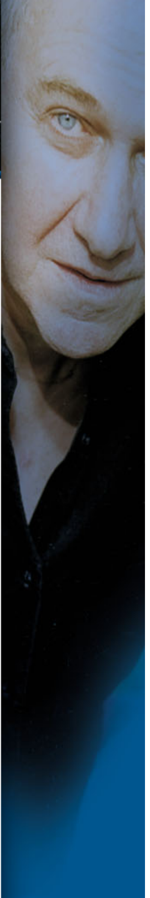
While AMD and Intel are often pictured as competitors in a bare-knuckle boxing competition, the truth is that both firms are efficient, employ highly talented people, and are contributing significantly to the common weal.

This year will be significant for exciting technology from the semiconductor manufacturers. Personally, I am looking forward to buying a computer with a microprocessor that isn't humdrum and will have a lot to offer in terms of performance and price per buck. ▲

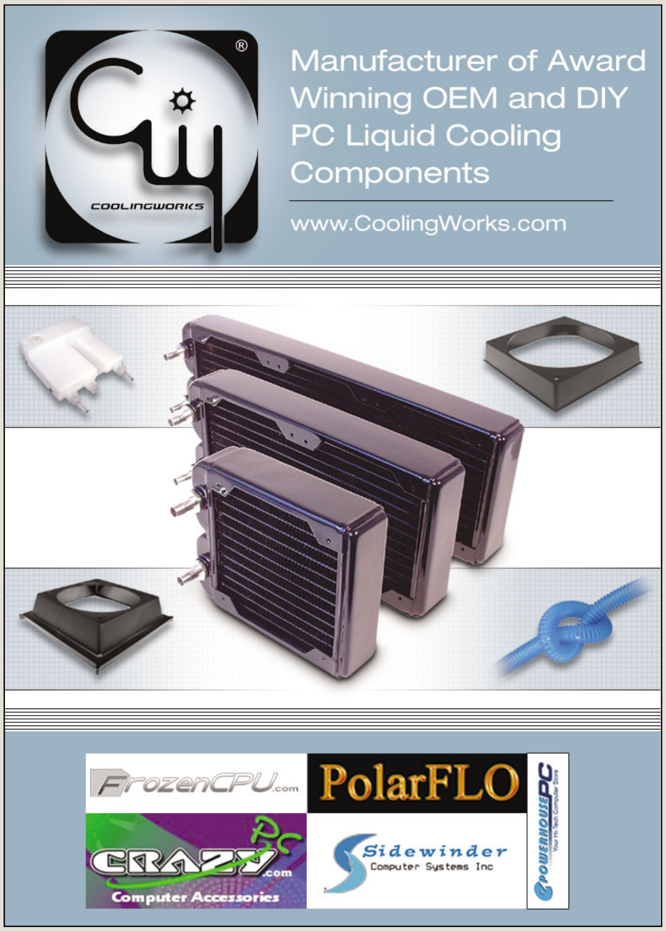
Send rumours to "Mad Mike" Magee at Mike@cpumag.com.



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.



. . . Intel continues to be a very profitable company . . .



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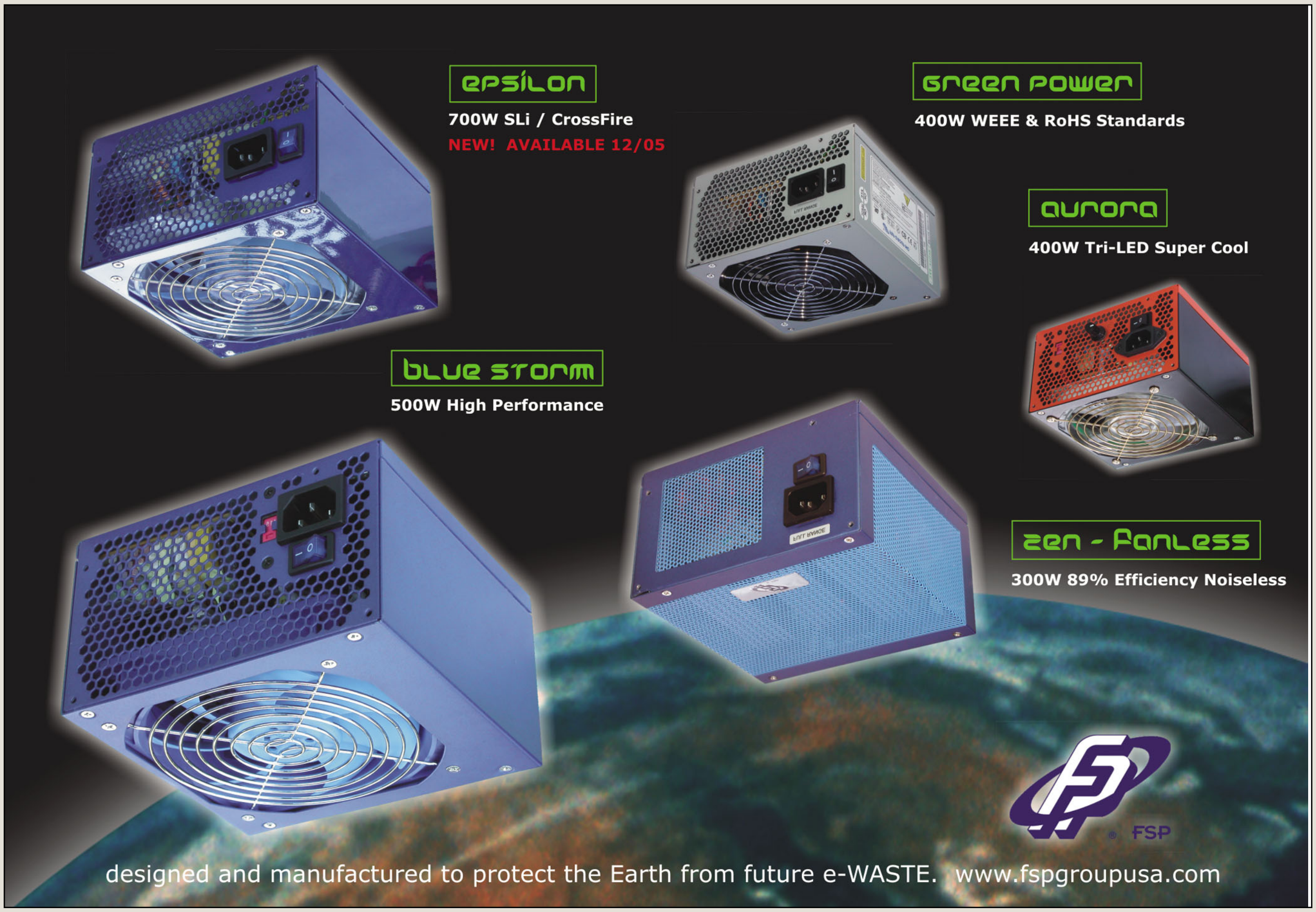

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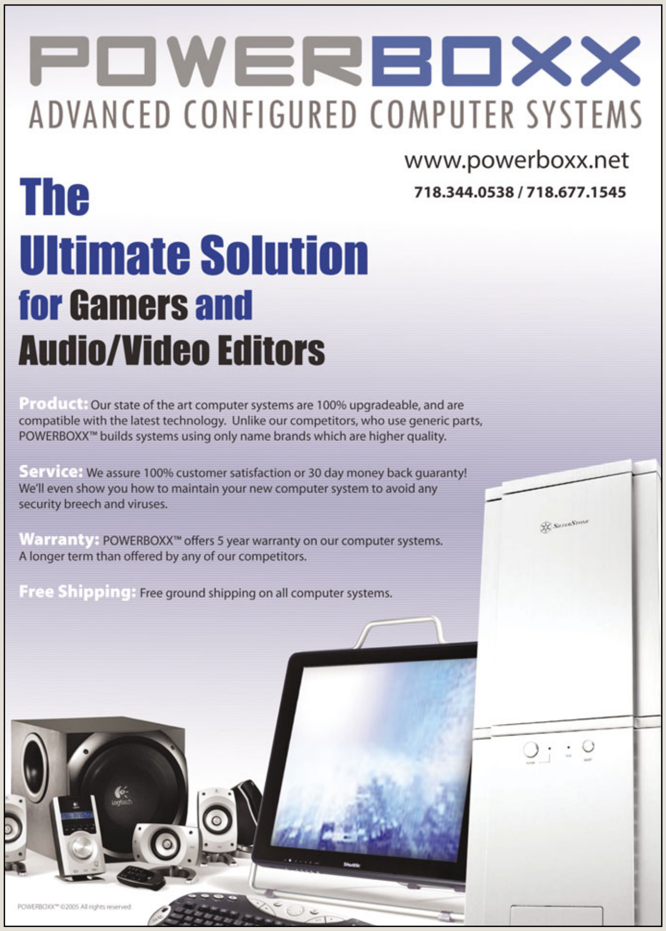
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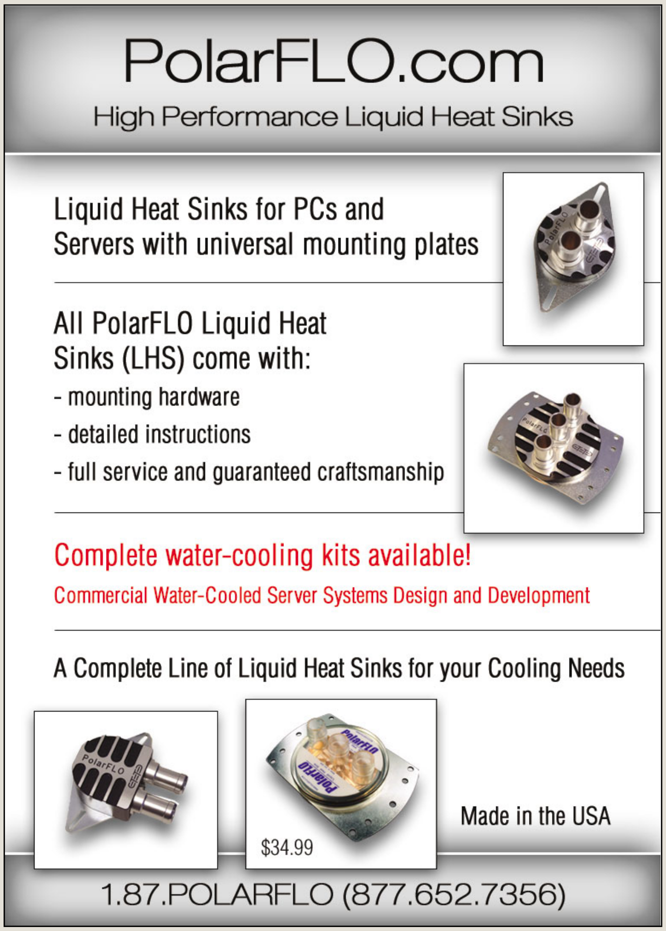
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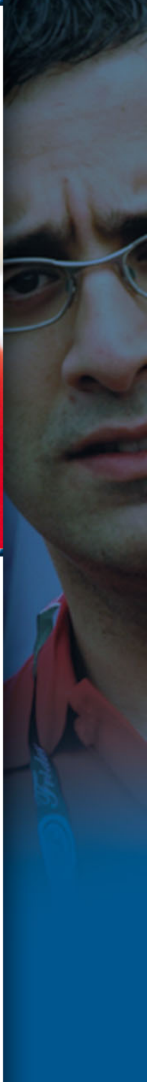
Hot Seat

Guest Column
by Rahul Sood

I Work In A Glass House

Rahul Sood's love for computers started at the young age of 11. Much to the shock and dismay of his parents, he ripped apart his brand new Apple //c and painted it red before turning it on. His parent's dreams of having a doctor for a son were shattered when college drop-out Rahul founded what is now one of the most respected high-end computer companies in the world, Voodoo Computers.



Voodoo is guided by the principle that the customer experience will ultimately define our success or failure. A number of years ago we spotted a trend within our customer base that proves tech-savvy customers are quite vocal. Gamers tend to be extremely influential when it comes to technology buying decisions. As a result, we launched the MUTTHABoards, a public forum hosted by Voodoo that lets people openly speak about whatever topic comes to mind.

In this day and age of ecommerce it is very important that we recognize the difference between the new-world model of customer service and the old world.

In the old world, a customer would buy a product, take delivery, and experience the product. They would tell 10 of their friends about their experience and life would go on. Sometimes they'd be prompted to take a customer service poll in a magazine, such as *PC Magazine*. The trouble with magazine reader surveys is they are usually limited to only a select few companies. It's also difficult to get accurate answers about customer experiences by putting them on the spot with "market research." In the old world, memories were generally short.

In the new world, the customer will not only tell 10 of his friends but will also write a blog, utilize online rating sites, and, most importantly, he will visit online forums and speak of his experience from the heart. Whether complaints are valid or not, we have to take seriously what it was that invoked the emotion that caused the complaint in the first place.

Typically, old-world companies pay very little attention to what is happening on the Internet. They discount online forums as general rhetoric and continue with their daily business. They put on their blinders and almost ignore any of the unofficial PR that flies around about their company. Sometimes they go as far as to try to shut down discussions, close forums, and even make their forums private for customer use only. In some companies, CEOs and upper management tend to remain unapproachable, and in most cases that attitude eventually permeates the organization. Rarely will you witness employees actively participate on online forums as representatives of their company in the old world.

At Voodoo, I decided that we needed the MUTTHABoards to keep us in check. The old world believes that this is a dangerous practice. One customer, who I hold in very high regard, told me that I'm crazy for opening up like this. He may have had a point, but to me that was old-world thinking. We shouldn't worry about people speaking their minds about their experiences, good or bad. Believe me, your company has serious issues if you're too busy shutting people up rather than getting to the heart of the matter.

Old-world companies should take notice of this. Blogging isn't a fad, neither are public forums. You should give people a place to vocalize issues within and outside the organization, and we must be willing to listen and make changes. We must start embracing these methods of communication and work to leverage the valuable, *free* feedback we receive in order to improve our businesses. There is no better "focus group" than an online forum.

We must also keep in mind that customers aren't stupid. If someone has a complaint that isn't valid or is one-sided, they tend to get exposed in a group environment; thus the age-old saying "The customer is always right" isn't necessarily true. If the complaint is valid, you'll start to see others join in the chaos and hopefully we'll learn something from it. It's idealistic to think we cannot make the same mistake twice, but it's certainly good practice to avoid it.

Knowing that we will always have complaints, how are we going to deal with them? Are we simply going to ignore them? Should be brush them under the mat, or should we do everything we can to find out what sparked the complaint and try to put a stop to it in the future? Merely having a forum isn't enough; I think anyone who touches the customer in any organization should participate in open discussions, period. ▲

Blogging isn't a fad, neither are public forums.

Send comments to Rahul@cpumag.com.

Technically Speaking

An Interview With Aldo Bussien & Todd Yuzuriha, Logitech Architects

Logitech itself needs no introduction. If you've read our mouse, headset, cordless desktop, gaming controller, and speaker reviews over the years, you know that the company consistently lands on the top shelf in practically every category it tackles. Such mastery, however, requires impressive masterminds. We wanted to try something a little novel in this month's "Technically Speaking." Our original plan was to have Logitech's top three vice presidents of engineering gather in a roundtable discussion to explain just how they rock so hard. Because of insane pre-holiday schedules, though, we lost the "Web cam guy" but landed the best two out of three.

Swiss-born Aldo Bussien, vice president of control devices, is a Logitech lifer. He joined the company in 1986 as an engineer having never held a real job outside of school. Todd Yuzuriha is vice president of engineering for the audio and interactive entertainment product lines, which covers everything from speakers to game controllers. Yuzuriha was head of engineering at Labtec prior to Logitech acquiring it, and before that, he was head of R&D for LCDs at Sharp.

by William Van Winkle

CPU: Is there a foremost design principal that Logitech pursues when working on new products?

Bussien: There is absolutely a vision of what a Logitech product should be. We need to have an industrial design that is kind of surprising, attractive, interesting, fashionable. Then we want functionality that is obvious, friendly, easy to use. We have a third vector, which is of course, technology. Here we are very careful because it's easy to load products with technologies that kind of work and that require users to spend their nights getting them operating. We really strive to have technology that works with real user benefits seamlessly. So those are roughly the guiding principals when it comes to designing products.

CPU: Do you handle all of your industrial design internally, or do you hire outside firms?

Bussien: No, we do no industrial design. Everything is subcontracted.

Yuzuriha: That said, under the surface, audio products are pretty much all developed in Vancouver, Wash. My group entails electrical engineering, acoustic engineering, mechanical engineering, PCB layout, compliance engineering, safety—the whole gamut in designing the product. We do that in Vancouver, and then we have an office in Hong Kong that acts as our interface to the factories. The factories are in China, and we do a lot of contract manufacturing with factories over in China. So I guess that's where the outsourcing part of it comes into play, on the manufacturing side.

CPU: In a similar vein, Logitech obviously started as a mouse company and has expanded way beyond that, sometimes through internal growth and sometimes through acquisition. Aldo, your Harmony group would be the latest example. How do you know when to build internally and when to acquire?

Bussien: Well, every product line internally needs to develop a growth plan, a strategy, a vision, and so forth. Ultimately, some of them have higher potential than others. Now, if you want to grow more, and whenever it makes sense and you find the right opportunity, then we do some kind of small to medium-sized acquisition that is synergistic to our current lineup or development efforts.

Our last three acquisitions, including Harmony, have been successes. Harmony is the most visible now because it's the latest one. But we had been looking for quite some time as to the right way to enter this field. In meeting with Harmony, we immediately found a match. But I think you almost always need to do a little bit of internal development to understand what you are acquiring. If you want to succeed in acquisitions, you need to have some knowledge. Otherwise you're kind of blind when you're negotiating. If you look at the camera side, the Web cam, we had internal developments of Web cams at the time, but then when the opportunity came up, we were capable of evaluating and moving extremely fast.

CPU: Todd, Labtec was a big acquisition for Logitech in 2001. But we know from the '90s that there is a huge performance gulf between the Labtec tin cans that used to bundle with PCs and the incredible 5.1 sets your group makes now. How did you get from there to here?

Yuzuriha: I think the thrust started with Labtec in '99. We wanted to go from a source model, where we just took products from suppliers over in China, to designing our own products. When I started in '99, I was building up the engineering group. With engineers we were then able to do our own designs internally. Logitech has been able to invest in us even more, and it's been tremendously successful for the company. And I think the Logitech brand name also helps. In 1999 and 2000, we did have capabilities to design some higher-end speaker systems, but Labtec, like you said, was a very strong brand name for lower, value-conscious-type products. With Logitech we've been able to build that brand name and develop higher-end products.

CPU: Ever since the Z-680s, it seems like Logitech speaker quality has stayed about flat, while feature-breadth continues to rise. How can you keep evolving the product in terms of audio quality rather than just function?

Yuzuriha: That's a complex question. Within the product development group, you'd be amazed at how many product ideas we have on our potential roadmap. Engineering and product marketing work very closely together. Product marketing would want to have ideally about 100 audio products launched a year, and we always have to pare that down to the most innovative and exciting products. I have particular engineers who spend most of their time devoted to future technologies and future roadmaps for products. We're continually looking at not only the roadmap that we want for next year but two and three years beyond.

CPU: OK, but that doesn't really answer the question.

Yuzuriha: [laughs] Well, I can't divulge what we're doing for next year.

CPU: Sure, so let's try this: Does it get incrementally or exponentially harder to improve audio quality as you advance given what you've achieved so far?

Yuzuriha: For the stable markets, like PC speakers because that's maturing, it does get more difficult to innovate. We are also branching out into new categories, such as portable speakers for MP3 players. It's easier to innovate there because we're new to that area. I guess it just depends on the maturity level of the market that we're developing products for, whether it's more incremental improvements or totally innovative and revolutionary.

Bussien: And again, so much of it has to do with those roadmaps and planning. If you go to a company and you don't see a pile of ideas in various stages, you know there's trouble. You can have a success from time to time, but if you want to have success year after year, you really need to have a stream which is going through the process.

CPU: Is it possible to innovate too far? The example that jumps to mind is Logitech's io digital pen. Very cool device but kind of a dud in the market. Is that our own misperception, or is io a little too radical for today?

Bussien: No, I think your perception is quite right. It is already not easy to find what is a good idea, but it is extremely difficult to understand when it's going to succeed in the marketplace. I don't know if you have seen Geoffrey Moore's book, "Crossing the Chasm," which is an outstanding marketing book that describes the various stages of innovation. Concepts like io could stay in this chasm for a few years. Of course, we would hope that every idea would succeed right away, but product ideas like io are rather disruptive, and usually with these products, we take much more risk.

It took us a few years to succeed in cordless, for instance. We started shipping the first cordless mouse in 1992, and at the beginning we were not shipping more cordless mice than we are shipping ios today. At the beginning you have the limitations of the technology. If you look at the first io pen, the size was quite big, maybe even repelling for some people. But with miniaturization coming, the size of the pen will get smaller, applications will get better, and so on. I think there is kind of a sweet spot that we need to reach. And you're right. We have not reached it yet for the masses. And are we absolutely sure it's going to succeed? Absolutely not. But Logitech will be ready to give it a try for a few years to improve the value composition, find the sweet spot, and take advantage of it when the time comes.

> If you go to a company and you don't see a pile of ideas in various stages, you know there's trouble. — Aldo Bussien

CPU: Todd, we will twist that question for you. When we first saw Immersion's haptic technology and felt it in Logitech's iFeel MouseMan, we thought that force feedback was going to sweep the world. However, it didn't. What happened exactly?

Yuzuriha: Well, on the gaming side, force feedback is a key feature in all our products, whether they are steering wheels or the game pads or the joysticks. It does add a lot to the gaming experience. With the iFeel the media loved it, but we discovered that the end-user didn't really find the benefit. I mean we were positioning it saying that it would help novice users or Web surfers find links that may be embedded in images or not realize that text is a hyperlink to another page. It would bump and vibrate and let them know about that. It was a great product innovation, but we're still a business and had to justify sales, and sales didn't do the ROI that we had once hoped. It was a great tool for us to get some visibility, but that's not how it was originally planned.

CPU: Are there specific challenges in your gaming lines that don't apply in the PC space?

Yuzuriha: Oh yeah. We have a great ecosystem for innovating and developing in gaming because we have really good connections within the industry that no hardware peripheral supplier has. Obviously, we have hardware and software expertise in-house to develop gaming products, but we also have great relations with all the game developers.

So we're the ones who are actively cultivating and pushing different ideas to the game developers, and the game developers really want to push their games. They're not so focused on how they can best support a new steering wheel. We're the ones driving that and coming up with software development kits, for instance, that we supply for free to the game developers. This makes it very easy for them to design into their game the latest feature on our steering wheel, which is, for instance, a 900-degree turn-to-turn feature that we had in one of our latest steering wheels. We also have really good relations with the game console manufacturers. But that type of work is unique to gaming. We don't have it, say, in audio.

CPU: Heaven forbid that you should accidentally spill any 2007 roadmap ideas, but do you have any thoughts on what might succeed the mouse/keyboard paradigm or how it could be radically improved?

Bussien: You know, in this market, there is huge inertia. This inertia is on one side extremely bad and on the other side extremely good because it gives some stability to the product line. What we need to do is to find the best peripherals for given operating systems or given platforms. If you look at consoles, for example, it's pretty clear that a mouse and a keyboard is not the best design. If you look at TV, the digital remote control is the mouse of this world. So we have to focus on what the platform's requirements are, how it's going to evolve, and introduce products that are in line with these requirements

CPU: So let's narrow it down to the desktop.

Bussien: Again, I cannot disclose everything we're working on, but given the inertia of the market, I'm quite convinced that we're still bound for many years with keyboards and mice as mainstream devices. Of course, there is evolution out there. The ratio of desktops to notebooks is changing. Notebooks have a slightly different user interface; it requires slightly different devices to operate. So I see more an evolution due to the form factor than an evolution that would be led by the desktop itself.

We used to have gaming desktops. Now, the media is becoming prevalent, and this is going to create new opportunities for us to create new devices for the desktop. We have new opportunities on the radar screen right now, some of them already for 2006, but those are not, as far as we can see, disruptive changes. For the next few years, the mainstream is still going to use a mouse and a keyboard, with a few additional devices which are more suited to people who prefer to focus on digital music and such.

CPU: And Todd, on the gaming side, where do we go from here in terms of the immersive experience? How do we take gaming to the next level through input devices?

Yuzuriha: Right, that's going to come with a new generation of gaming platforms. I mean, Xbox 360 and PS3, those are all about making the gaming experience more real.

CPU: Now, don't leave us hanging with a 'We listen to our customers, and stay tuned.' Come on; give us *something*.

Yuzuriha: [laughs] All I can say is with the computing power of those platforms, there will be more and more features we can put into the products. And we really do listen to our customers. I mean, on the gaming side, we have a dedicated Web site where users can give us feedback. Because our customers are so passionate on the gaming side, they're giving us good feedback—good or bad—on our products, and from an engineering standpoint, we definitely take those ideas and incorporate them into our next-generation designs.

With the business that we're in, we need to innovate. If we don't innovate, we die as a company. And because of that importance on innovation and because of the passion that the team has, both in product marketing and engineering, we are totally dedicated to coming out with the next big things in all possible areas. I guess you'll just have to stay tuned as to what those are.

CPU: D'oh! CPU

by William Van Winkle

Under Development

A Peek At What's Brewing In The Laboratory

Insert The Robot Surgeons—Stat!

There are robots that can vacuum your carpets, drive your car, and behave like your pet. And soon there may even be robots that can perform surgery on you—from the inside, that is.

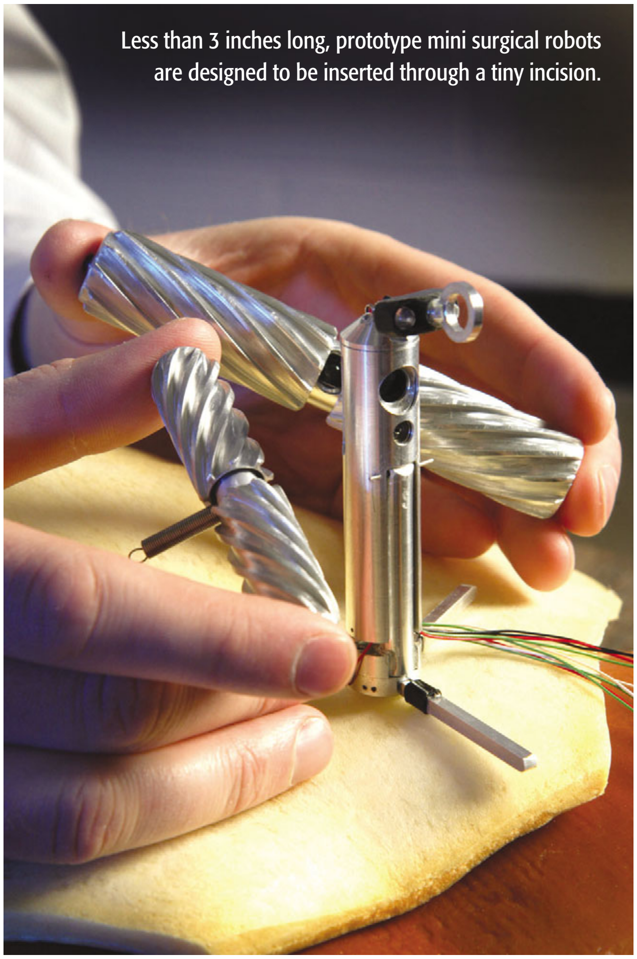
Although it sounds like something straight out of the "Star Trek" universe, a team of engineers and doctors at the University of Nebraska in Lincoln have developed mini surgical robot prototypes that are less than 3 inches long and are designed to be slipped into the body through a tiny incision. The robots are equipped with lights and a camera so that they can beam images back to the operator on the outside who is controlling the procedure.

The color images that the robots provide, magnified by a factor of 10, can provide a much clearer view than that of the naked eye. The robots also have several different tools that will allow surgeons to cut, clamp, and cauterize wounds remotely.

Robot-assisted laparoscopic surgery, where the surgical area is imaged and tools are controlled through a small incision in the body, is nothing new. But researchers hope that remotely controlling these tiny robots completely residing in the body can dramatically change the way surgery is performed, perhaps eventually rendering traditional hands-on surgery obsolete. For this first wave of robot surgeons, though, the scope is a bit more modest.

"The robots could assist in any procedure currently performed with laparoscopic techniques," says Shane Farritor, Ph.D., associate professor in the Department of Mechanical Engineering in UNL's College of Engineering and Technology. "We hope the robots will extend the use of laparoscopy to more complex procedures. Currently, laparoscopy is widely used in simple abdominal procedures (such as gall bladder removal) but is not as commonly used in more complex surgeries."

Today's robots are disposable and designed for a single-use. The team plans to apply for FDA approval sometime in 2006, a process that can take at least a year and a half. ▲



Less than 3 inches long, prototype mini surgical robots are designed to be inserted through a tiny incision.

Information At Your Fingertips

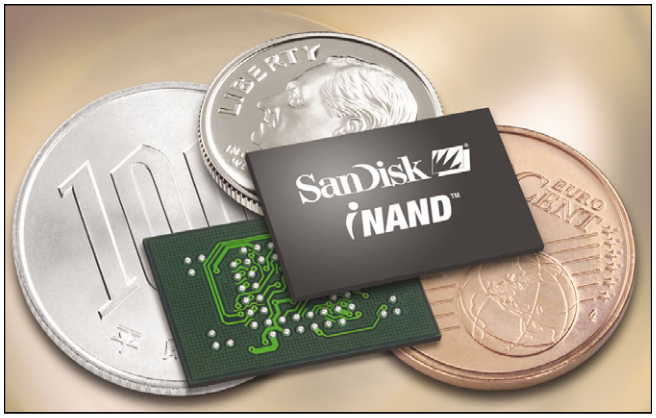
Cell phones and other Internet-enabled devices let us access large amounts of digital information on the fly. Although Googling for directions or sports scores on your Web-enabled phone is good, what if you were able to simply pick up an object and access information about it without having to scan in or type anything at all? Researchers at MIT are developing a system that will let users to do exactly this.

The ReachMedia system is made up of a bracelet that reads RFID tags attached to an object the user holds, an accelerometer to detect specific wrist movements, and a smartphone able to retrieve and display data about the object. The fetched data is presented in an audio menu format, and users navigate menu items with a flick of the wrist: downward for "select," left for "next," and right for "previous." After a brief training period, the bracelet learns to interpret a user's gestures with 95% accuracy, paving the way for a hands- and eyes-free browsing experience. The initial study focuses on a bookstore scenario due to the wealth of available online ratings/reviews, but Assaf Feldman has a wider vision.

"I can see it as a generic pervasive interface for interacting with any kind of object that a user might want to learn more about," says Feldman. "We thought of two main scenarios. One is a shopping scenario in which electronics or even clothes can replace the books. You can get reviews, price recommendations, and even compare two products with the bracelet. Another scenario might be a workshop where the system can alert and instruct the workers in an unobtrusive way."

Feldman predicts it will be at least two to four years before RFID is in wide enough use by retailers and at least four years until Bluetooth or another technology can support the gestural/audio interface sufficiently to make ReachMedia commonly available to consumers. ▲

Flash On, Flash Off



When it comes to booting up your computer, as the song says, the waiting really can be the hardest part. As operating systems have become more complex, the lag between pressing the on button and being able to start work has also become longer and more painful despite processor, DRAM, and disk drive speed increases.

Enter Robson, a new technology that Intel introduced at its October 2005 Developer Forum in Taipei. Relying on a NAND flash memory cache, Robson bypasses the hard drive during the startup process, booting instead from the information stored in its nonvolatile memory. This drastically reduces both start-up and application switching time. A Robson card can hold anywhere from 64MB to 4GB of memory.

Although Intel isn't publishing any benchmarks for Robson at this point, spokeswoman Connie Brown tells us that it is "noticeably quicker going from a sleep to awake state or from being turned off to turned on." More specifically, first-person accounts from IDF noted that the start-up time on a Centrino-based notebook was "almost immediate."

Brown informed us that the first commercial implementations of Robson will be on an add-in mini-PCI card for notebook computers, but that "it does scale, so I'm sure that we will see it on desktops, as well." With notebooks Robson will provide added value in the form of longer battery life. With less need to spin the hard drive, there's less battery drain.

No timeline has been provided for Robson's availability to consumers. Brown states that the technology is mature enough to show to computer manufacturers, but "which OEMs are interested, time and the market will tell." We'd like to see some designs, oh, right about now. ▲

Let The Wookie Win—With PlayAnywhere

Remember that scene in "Episode IV" where R2 projects a strategy game on the table for Chewbacca and C-3PO to play? Soon, you may be able to game similarly, only you won't need a big droid, just a pocket-sized projector courtesy of Microsoft Research's PlayAnywhere project. When you set a PlayAnywhere device on the table and turn it on, it can project a 3D image of a game board, complete with the pieces scattered about. Now, because this is a standard optical projector, not a holographic projector, images are still flat on the table surface, but you can't expect the future overnight. Playing against the computer is a given, but playing against an unseen remote opponent can only be a half-step behind.

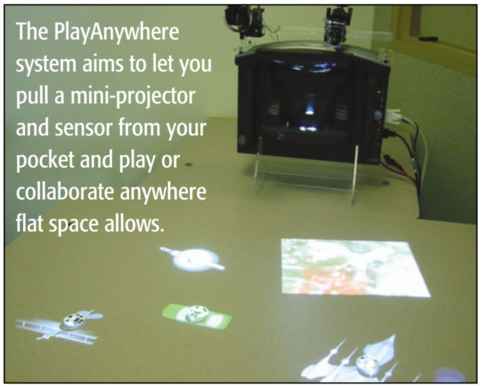
PlayAnywhere is a standalone, front-projected, computer vision-based system that lets a user interact with images projected on a tabletop. It is also able to sense and track multiple sheets of paper placed on the viewing surface, creating a workspace that merges the virtual with the physical world.

PlayAnywhere, developed by Microsoft Research scientist Andrew Wilson, combines an NEC tabletop projector, an infrared light source and camera, and a computer. The system projects a 40-inch diagonal image downward onto the surface on which it stands. To detect touch and let users manipulate the projected images with their fingertips, PlayAnywhere uses an algorithm that tracks the shadows made as fingertips approach the projection surface. PlayAnywhere can also detect hover and touch, allowing users to push virtual buttons, resize and move objects, and draw.

Although Wilson believes that the earliest application of the technology is likely to be in gaming, he also sees great possibility in the business world. "Imagine interacting with a map or some planning software or graphics layout in which multiple people can look at and manipulate the same data," he says.

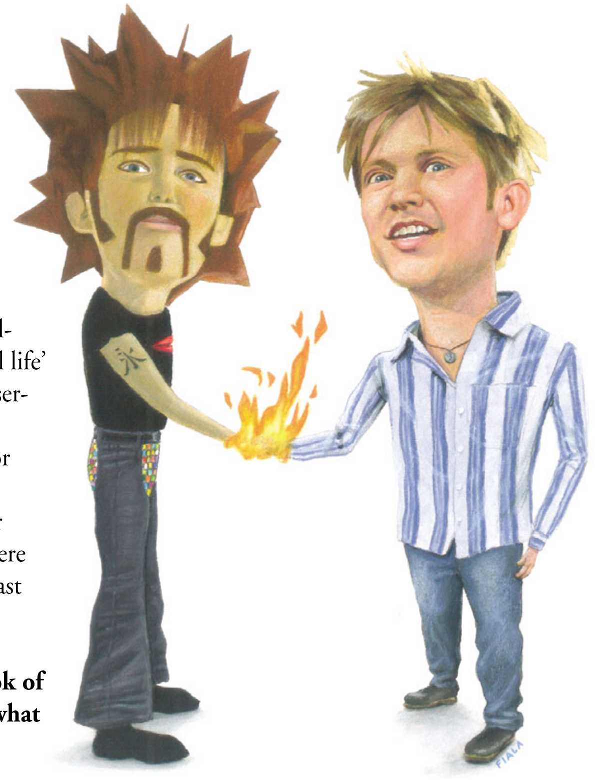
Unlike other projector-based interactive systems, which require mounted cameras and special viewing surfaces, a user could set up PlayAnywhere on any flat surface, and PlayAnywhere requires no special calibration. This helps to advance the portability factor that is necessary if systems such as PlayAnywhere are ever to see wide consumer use.

When exactly can you expect to have a PlayAnywhere projector in your pocket? Well, as you might expect, a lot of that answer has to do with component pricing and how quickly miniaturization can downsize the current prototypes. Wilson says, "Historically, such systems have been prohibitively expensive because of the projector, but projectors are coming down in price rapidly. ▲



The PlayAnywhere system aims to let you pull a mini-projector and sensor from your pocket and play or collaborate anywhere flat space allows.

Q&A With Philip Rosedale



From this side of the keyboard, interviews are a bit like TV. Some shows are fun and forgettable, some engaging enough that you want to tune in again, and some grab you at a level so profound that you never want the show to end. Such was *CPU*'s talk with Philip Rosedale, ex-CTO of RealNetworks and now CEO of Linden Lab, creator of the virtual world Second Life (www.secondlife.com). Whether you're a gamer, a closet tycoon, in need of friends, or in need of crafting your own world, Second Life will blow your mind as much as an hour-long talk with Rosedale blew ours.

Q **The real world has built-in scaling problems: overpopulation, plague, natural resources, etc. Are there similar future dilemmas in Second Life?**

PR That's a pretty profound metaphysical question. Do all worlds have limits? We do actually have resources—land and primitives and scripts. You can only have so many scripts on a simulator before the simulator just slows down and stops working and the world becomes immutable. Second Life has been designed so we can add computation or simulation, but there will be times where people will be coming in at a rate faster than we'll be able to add simulation. There will be overcrowding in parts of Second Life and competition for resources. There is tremendous competition for land today.

Q **Do the economies of the real world and Second Life overlap?**

PR Real world economies and Second Life's economy are in constant overlap. First of all, the in-world currency, or Linden Dollar (L$), can be exchanged at currency exchanges such as the LindeX for real U.S. dollars. Currently the exchange rate is L$252 for US$1. Many, many Residents have 'real life' jobs in Second Life (fashion designers, newspapers, architects, full-time scriptors) and are making a 'real life' income by selling virtual goods and services. In October 2005, the GNP of Second Life was L$1,041,865,650, or US$4,134,387, and user-to-user transactions were L$695,425,923, or US$2,759,626. Last month, there were over 450 people who had made at least US$1,000 a month in Second Life.

Q **If you were to update the look of your avatar, Philip Linden, what would you do and why?**

PR I've always imagined creating some sort of a Michelangelo Greek god. I think mythology emerged as a property of the rules of systems. I'm saying this kind of jokingly, but I'm kind of drawn to the idea that God is the code.

Q **Meaning?**

PR What are the physical laws of the Internet? We have observed that laws like 'gambling is illegal' are not meaningful on the Internet. So what is the law, then, of the Internet? It's HTTP. What you can do with that protocol, say SSL extensions, that's the law, the physical law. It's a capability, just like physics. The most broadly accepted versions of the protocol are the physical laws and then by extension, depending on how religious you want to be, they are what we think of as God. So if you were to draw it to mythology, I think the Second World authors are most like the Greek and Roman gods. We're imperfect. We sometimes disagree. Maybe very rarely we actually fight. And we have certain specializations. So if I was to do another avatar, I'd be like marble, like one of the Michelangelo slaves or something. I would appropriately fit the concept of an imperfect but inherently human and well-meaning—hopefully, on a good day—Greek god.

Q **What's the most surprising experience you've ever had within Second Life?**

PR There was a guy early on who figured out how to build immensely complicated things using scripting. I remember standing there with him in the forest. He typed something like 'modern.' All of a sudden, his whole property reconfigured itself. Things moved around and zoomed into position and resized themselves, and suddenly we were standing in a very cool modern building. Then he typed a few other sentences, and it would transform itself into another thing. Similarly, you'll be standing there in Second Life chatting with a bunch of people and a perfect military attack helicopter will come by, sounds and all, and you know it's this new thing that somebody just built. I've had moments where I was just sitting and something will come by overhead, and I'm like, 'Oh, my God, I'm here. It all really worked.'

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William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside Portland, Ore.

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